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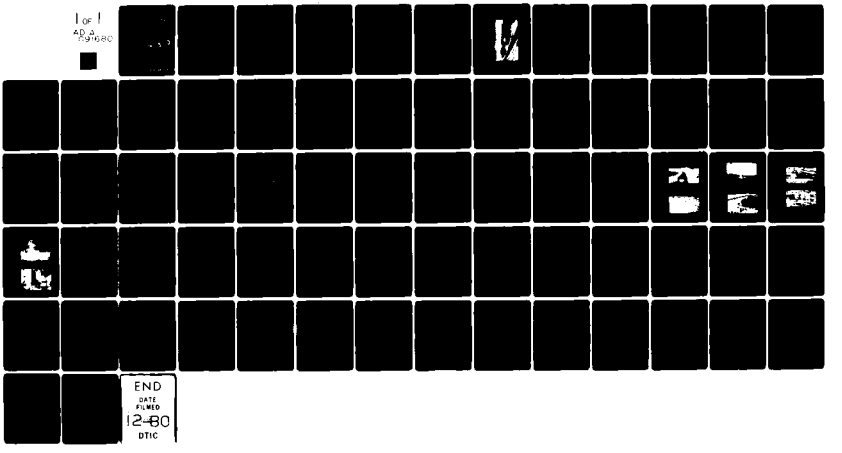

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POTOMAC RIVER BASIN
WHETSTONE RUN, MONTGOMERY COUNTY

MARYLAND

LAKE WHETSTONE

NDI ID NO. MD-53

MONTGOMERY VILLAGE FOUNDATION

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DACW31-80-C-0050

Prepared For
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

By
RUMMEL, KLEPPER & KAHL
Consulting Engineers
Baltimore, Maryland 21202

JULY 1980

POTOMAC RIVER BASIN

WHETSTONE RUN, MONTGOMERY COUNTY

MARYLAND

Inspection Program.

LAKE WHETSTONE

(NDI ID NO. MD-53), Potomac River Basin, Whetstone Run, Montgomery County, Maryland.

MONTGOMERY VILLAGE FOUNDATION
GAITHERSBURG, MARYLAND

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Prepared for:
DEPARTMENT OF THE ARMY
Baltimore District Corps of Engineers
Baltimore, Maryland 21203

DACW31-80-C-0070

By:
RUMMEL, KLEPPER & KAHL
Consulting Engineers
1035 N. Calvert Street
Baltimore, Maryland 21202

July 1980

41193

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

POTOMAC RIVER BASIN

WHETSTONE RUN, MONTGOMERY COUNTY
MARYLAND

LAKE WHETSTONE
NDI ID NO. MD-53

MONTGOMERY VILLAGE FOUNDATION
GAITHERSBURG, MARYLAND

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

July 1980

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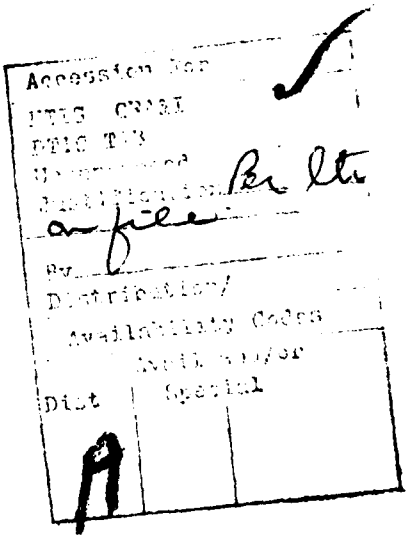


PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION
AND RECOMMENDED ACTION

Name of Dam:	Lake Whetstone NDI ID NO. MD-53
Size:	Small (930 acre-feet, 33.8 feet high)
Hazard Classification:	High
Owner:	Montgomery Village Foundation 19231 Montgomery Village Avenue Gaithersburg, Maryland 20760
State Located:	Maryland
County Located:	Montgomery
Stream:	Whetstone Run
Dates of Inspection:	June 26, 1980 and July 15, 1980

Based on the visual inspection, available records, past operational performance, and in accordance with the guideline criteria established for these studies, Lake Whetstone is judged to be in good condition.

The water level in Lake Whetstone is normally maintained at elevation 362 by way of a rectangular concrete drop inlet spillway. Sources of inflow to the lake include Whetstone Run inflow, storm drainage, surface water runoff, and rainfall on the lake surface.

No stability problems were evident for the embankment at the time of the visual inspection.

Based on the hydrologic and hydraulic analyses, the Lake Whetstone spillway can pass approximately 59 percent of the Probable Maximum Flood (PMF) without overtopping. The spillway capacity is rated as inadequate because, even though the spillway can pass at least 50 percent of the PMF, analyses indicate that the spillway cannot pass the Spillway Design Flood.

At the time of inspection, water was flowing from only the right side of the twin box culvert, which is the outlet works for the spillway. No blockage of the left side was observed from the outlet end of the twin culvert, but a blockage may exist in the bottom of the drop inlet chamber, which is accessible by boat.

Although not apparent at the time of inspection, according to conversations with the Owner, siltation of the lake is a continuing problem. The dam was completed in 1966, and dredging was necessary in 1972. It is estimated by the Owner that dredging will be required again in 1983. This problem of relatively rapid siltation has not been resolved.

Lake Whetstone
NDI ID NO. MD-[illegible]

The following remedial measures are recommended to be accomplished by the Owner in a timely manner:

1. Repair the structural crack on the face of the north headwall of the outlet structure.

2. Remove the corrosive build-up which is partially obstructing the northern toe drain outlet.

3. Repair the erosion behind the south wingwall of the outlet structure.

4. Inspect the chamber of the drop inlet spillway to determine if there is a blockage to the left side of the twin box culverts and remove any obstructions which exist.

5. Schedule formal periodic inspections of the dam embankment and appurtenant structures.

6. Develop a formal warning system to alert downstream residents in the event of emergencies.

Submitted by:

RUMMEL, KLEPPER & KAHL

STATE OF MARYLAND
EDWARD J. ZEIGLER
No. 7596
REGISTERED
PROFESSIONAL ENGINEER

Edward J. Zeigler, P.E.
Associate

Date: [illegible]

Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 24 Sept 1980

LAKE WHETSTONE

AN OVERVIEW

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE WHETSTONE
NDI ID NO. MD-53

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the dam inspection program is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Lake Whetstone, completed in 1966, is retained by a zoned earthfill embankment. The embankment is approximately 33.8 feet high at its maximum section and approximately 1000 feet long. A drainage trench toe drain is indicated on available as-built drawings. Except for the 1000-foot length of embankment, the shoreline of the lake was constructed by excavation into original ground.

Outflow from the reservoir can be accomplished by opening a sluice gate at the base of the drop inlet structure. The gate is manually operated and the gate stem is located on top of the drop inlet.

The various features of the dam and impoundment are shown on the Photographs in Appendix C and on the Plates in Appendix E. A description of the geology is included in Appendix F.

b. Location. Lake Whetstone is located along to Whetstone Run in Montgomery County, Maryland. Lake Whetstone is shown on U.S.G.S. Quadrangle, Gaithersburg, Maryland, at latitude N 39° 10' 00" and longitude W 77° 12' 20". A location map is included as Plate E-1.

c. Size Classification. Small (33.8 feet high, 930 acre-feet).

d. Hazard Classification. High. Downstream conditions plus the fact that a major roadway traverses the dam crest indicate that a high hazard classification is warranted for Lake Whetstone.

e. Ownership. Montgomery Village Foundation, 19231 Montgomery Village Avenue, Gaithersburg, Maryland 20760

f. Purpose of Dam. Aesthetics, Recreation and Flood Control.

g. Design and Construction History. Lake Whetstone was designed, by Greenhorne, O'Mara, Dewberry, and Nealon, of Fairfax, Virginia, and constructed in 1966. The general contractor for the dam was Northrup and Morrison, Inc. of Silver Spring, Maryland. Detailed as-built drawings of the embankment and appurtenances are available.

h. Normal Operating Procedure. The lake is maintained at the level of the drop inlet. If the water level in the lake must be lowered, a sluice gate located at the base of the drop inlet structure is opened.

1.3 Pertinent Data.

a. Drainage Area. 3.34 square miles

b. Discharge at Dam Site(cfs). 2715

c. Elevation (Feet).

Top of Dam	378.5 (design)
	377.8 (low point on crest)
Maximum Pool	374.3 (design flood level)
Normal Pool	362.0 (spillway crest)
Upstream Invert Outlet Works	344.74
Downstream Invert Outlet Works	341.92
Maximum Tailwater	Unknown
Downstream Toe	344

d. Reservoir Length (Feet).

Normal Pool Level	2400±
Maximum Pool Level	4600±

e. Storage (acre-feet).

Normal Pool Level	167
Maximum Pool Level	692
Top of Dam	930

f. Reservoir Surface (acres).

Normal Pool Level	26.6
Maximum Pool Level	61.0
Top of Dam	76.5

g. Dam.

Type	Earth
Volume of Fill	175,000± cubic yards
Length	1000± feet
Height	33.8± feet
Top Width	92± feet
Side Slopes	Downstream: 1V:3H
	Upstream: 1V:3H
Zoning	Yes
Impervious Core	Yes
Cutoff	Yes
Grout Curtain	None

h. Regulating Outlet.

Type	7.0' x 8.0' Twin Box Culverts
Length	282 feet
Closure	48inch x 48inch sluice gate
Access	Intake tower

i Spillway.

Type	Drop Inlet
Length	60'
Crest Elevation	362
Gates	None
Upstream Channel	Lake
Downstream Channel	Stilling Basin and Whetstone Run

SECTION 2
DESIGN DATA

2.1 Design.

a. Data Available. Detailed as-built drawings of the embankment and appurtenances, and the design report for the dam are available.

(1) Hydrology and Hydraulics. Hydrologic computations are included in the design report.

(2) Embankment. A typical section of the embankment indicating a zoned core and cutoff is available and is included as Plate E-2.

(3) Appurtenant Structures. Detailed drawings are available for the drop inlet and sluice gate structure, twin box culvert, and stilling basin.

b. Design Features.

(1) Embankment. As-built drawings indicate that an earth embankment approximately 1000 feet long and as much as 35 feet high was constructed across the Whetstone Run stream valley. The embankment now serves as the roadway foundation for Montgomery Village Avenue. The drawings indicate the embankment was constructed with a crest width of approximately 92 feet, and has a zoned core and drainage and cutoff trenches.

(2) Appurtenant Structures. The appurtenant structure for the dam consists of the drop inlet, twin box culverts, and stilling basin. Detailed drawings of these structures are available.

c. Design Data.

(1) Hydrology and Hydraulics. Pertinent computations and a storm hydrograph are included in the design report.

(2) Embankment. Cross-sections at several locations along the embankment are included in the design drawings, as well as embankment centerline sections and drainage and cutoff trench profiles.

2.2 Construction. The dam was constructed by Northrup and Morrison, Inc. of Silver Spring, Maryland, however is is unknown what, if any, construction supervision was provided. As-built drawings of the project are available.

2.3 Operation. No formal operating records have been kept for the dam. According the discussions with the Owner, the lake was lowered in 1972 for maintenance dredging.

2.4 Other Investigations. None Reported.

2.5 Evaluation.

a. Availability. Detailed design information is available.

b. Adequacy. The available data is considered sufficient to evaluate the design and construction of the dam.

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. The on-site inspection of Lake Whetstone consisted of:

(1) Visual inspection of the embankment, abutments, and embankment toe.

(2) Visual examination of the appurtenant structures.

(3) Evaluation of the downstream area hazard potential.

The specific observations are shown on Plate A-1.

b. Embankment. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features. No evidence of structural distress was noted during the inspection. A minor amount of erosion was noted just above the upstream riprap slope protection at the right end of the dam.

The crest of the dam was surveyed and the variance in elevation was 5 feet between the high and low point. This variance is due to the vertical curve of the roadway across the dam crest. The low point on the crest is approximately 8 inches below the design crest elevation of 378.5, and is located 50± feet left of the intersection of the twin box culverts of the spillway and the embankment. Freeboard at the time of inspection was approximately 16 feet, and under maximum pool (i.e. design flood) conditions would be approximately 3.5 feet. The dam crest profile is included as Plate C-2.

c. Appurtenant Structures. The appurtenant structures were satisfactory with the exception of the right headwall and left wingwall located at the outlet of the twin box culvert and a potential blockage in the left side of the twin box culvert. The right headwall is cracked, the toe drain outlet through the right headwall is partially obstructed by a corrosion deposit, and erosion was noted behind the left wingwall. The ability of the left side of the twin-box culvert to function as designed may presently be impaired since it was observed that most of the flow from the spillway riser was being conveyed through the right side of the culvert.

d. Reservoir Area. It is apparent that much of the runoff from the residential area which surrounds the lake flows into the lake. While no erosion was noted along the banks, overflow from a sedimentation pond used to control runoff from an adjacent construction site empties into the reservoir.

e. Downstream Channel. The floodplain directly downstream of the dam is utilized primarily for recreation. Apartments are located on either side of the floodplain recreational area. Failure of the dam could cause significant damage to several of the apartment units located immediately downstream from the dam. Floodwaters from a dam failure could also damage Watkins Mill Road, a secondary road crossing located approximately 2800 feet downstream of the dam. A school is located upstream of the Watkins Mill Road bridge and above the floodplain. Based on these observations, a high hazard classification is warranted for Lake Whetstone dam.

3.2 Evaluation. The visual examination of Lake Whetstone indicates that except for the few problems noted on the headwalls and wingwall at the outlet of the twin box culvert, and the potential blockage of the left culvert, the embankment and appurtenant structures are in good condition. An inspection of the twin box culvert should be made to determine the reason for an apparent blockage of flow in the left side of the twin box culvert.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. There are no formal operating procedures for the dam. The reservoir level is normally maintained at elevation 362.0 by means of a drop inlet spillway.

4.2 Maintenance of The Dam. The maintenance of the dam is considered good. The crest of the dam carries Montgomery Village Avenue, which is maintained by Montgomery County. The upstream face is grassed, with a berm near the base and asphalt walkway. Riprap slope protection is placed along the shoreline. The downstream face is grassed. Both upstream and downstream slopes are mowed regularly.

4.3 Maintenance and Operating Facilities. The maintenance of the operating facilities is considered fair. The north headwall and south wingwall of the outlet structure obviously need some repairs. No scheduled formal inspection program for the facilities exists.

4.4 Warning System. No formal warning system exists for the dam.

4.5 Evaluation. The maintenance of the dam is considered good, while the maintenance of the operating facilities is considered fair.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features.

a. Design Data. The March 1966 Design Report for Lake Whetstone, Montgomery Village, Montgomery County, Maryland, indicates that the reservoir spillway design was based upon an inflow design flood of 9160 cubic feet per second (cfs) resulting from a 6-hour storm of 9.8 inches over the reservoir's 3.34-square mile drainage area. A storm frequency was not indicated for the 9.8 inches of rainfall. Using the 9160 cfs peak inflow rate, the maximum flood storage level was established at an elevation of 374.3 feet above mean sea level, and a freeboard of 4.2 feet was employed to establish the design low point in Village Avenue, the thoroughfare carried by the dam embankment, at an elevation of 378.5 feet above mean sea level.

b. Experience Data. No records of maximum pool levels are available.

c. Visual Observations. Several observations made during the visual inspection of Lake Whetstone are particularly relevant to the hydraulic and hydrological evaluation.

(1) Embankment. The survey of the dam crest profile performed during the visual inspection indicates that the existing crest is slightly lower than its design elevation of 378.5 feet above m.s.l., with its low point at elevation 377.8 feet above m.s.l. The elevation data for the existing crest was employed in subsequent hydraulic analyses.

(2) Appurtenant Structures. The drop inlet spillway and outlet works appear to have been constructed in accordance with record as-built drawings. During the visual inspection, some debris was observed on the grating at the drop inlet spillway. While the amount of debris present would not significantly affect the spillway capacity, continued accumulation of debris would eventually adversely affect the spillway's hydraulic capacity.

The ability of the left side of the twin outlet box culvert to function as designed may presently be impaired since it was observed that most of the flow from the spillway riser was being conveyed through the right side only. It is assumed, however, that this condition can be corrected, and therefore the design rating curve presented in the design report for the outlet works has been used in subsequent hydraulic analyses.

(3) Downstream Conditions. Failure of the dam impounding Lake Whetstone could cause significant damage to several apartment units located immediately downstream from the dam and would sever the main traffic thoroughfare through the densely populated development, Montgomery Village Avenue, which is carried by the dam embankment itself. In addition the failure may damage Watkins Mill Road. a secondary road crossing located approximately 2800 feet downstream. In keeping with the potential hazard classification established by the Office of the Chief of Engineers (OCE), damage which may result to downstream multi-family dwelling units, and which will result to Montgomery Village Avenue upon a dam failure, indicates that a high hazard classification be assigned to Lake Whetstone.

d. Overtopping Potential. According to the criteria promulgated by the Office of the Chief of Engineers, the recommended Spillway Design Flood (SDF) for a dam classified as "small" with a "high" hazard potential ranges between 50 and 100 percent of the Probable Maximum Flood (PMF). While classified as a "small" dam, the capacity of Lake Whetstone puts it very close to the "intermediate" classification which, together with its "high" hazard classification, would require the use of 100 percent of PMF for its Spillway Design Flood. For this reason the 100 percent PMF has been selected as the SDF for Lake Whetstone.

The Probable Maximum Precipitation (PMP) index as adjusted for the Lake Whetstone drainage area is 19.2 inches in 24 hours. Employing criteria established by the Corps of Engineers, Baltimore District, 100 percent and 50 percent PMF inflow hydrographs developed using the HEC-1 computer program have peaks of 8000 and 4000 cfs, respectively. It is important to note that these peak flows are significantly less than the 9160 cfs design inflow previously determined in the design report for a 9.8-inch storm of 6-hour duration. This disparity is understandable since it is recognized that the Snyder method of synthetic unit hydrograph determination employed in the HEC-1 model for dam safety investigation studies may produce hydrograph peaks somewhat less than those derived using other methods when applied to relatively small drainage areas with comparatively short times of concentration. However, in accordance with guidance provided by the Corps of Engineers, Baltimore District, no adjustments have been made to the PMF's determined for Lake Whetstone to account for this disparity.

PMF inflow hydrographs were routed through Lake Whetstone for percentages ranging from 20 to 100 percent of the PMF with each routing starting at the normal pool elevation of 362 feet above m.s.l. For the 50 percent PMF routing, the reservoir water level reached an elevation of 374.8 feet above m.s.l. or 3.0 feet below the low point in the dam crest. For the 100 percent PMF routing, the reservoir water level reached an elevation of 380.1 feet above m.s.l. overtopping the low point in the dam embankment by 2.3 feet. Results for intermediate routings are found in Appendix D.

It is interesting to note that while the percent of PMF routing with a peak inflow rate of 8000 cfs overtopped the dam embankment, the original design flood routing having a higher peak inflow rate of 9160 cfs produced a flood pool level some 5.7 feet below that produced by routing the 100 percent PMF through Lake Whetstone. The reason for this difference is that the total amount and duration of runoff produced by the 100 percent PMF event is much greater than the total runoff amount and duration which would be produced by the original design storm. Hence, passage of the 100 percent PMF event through Lake Whetstone would require a greater amount of flood storage volume (accomplished by higher pool levels) than that required by passage through the reservoir of the original design flood event.

e. Spillway Adequacy. The analyses indicate that the Lake Whetstone spillway can pass approximately 59 percent of the PMF without overtopping of the dam. Since the analyses indicate the spillway cannot pass the Spillway Design Flood but can pass 50 percent of the PMF, the spillway capacity is rated as inadequate, but not seriously inadequate, in accordance with Office of the Chief of Engineers guidelines.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) Embankment. Visual examination of the dam embankment indicates that there are no wet spots, seepage, slumps or other features that suggest embankment instability.

(2) Appurtenant Structures: A structural crack was noted across the right headwall of the outlet structure. Erosion was noted behind the left wingwall of the outlet structure.

b. Design and Construction Data.

(1) Embankment. Based on the computations included in the design report for the dam, a proper assessment of the stability of the dam can be made.

(2) Appurtenant Structures. The available information includes adequate data to assess the structural adequacy of the appurtenant structures.

c. Operating Records. The structural stability of the dam is not considered to be affected by the operational features of the dam.

d. Post-Construction Changes. The only apparent post-construction activity was the dredging of Lake Whetstone in 1972.

e. Seismic Stability. Lake Whetstone is located in Seismic Zone 1. Based on visual observations, the static stability of the dam appears to be adequate. Consequently, the structure should present no hazard from earthquakes.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Assessment. Lake Whetstone is a small storage, high hazard impoundment. The dam embankment is in good condition and the appurtenant structures are in fair condition. A high hazard classification is warranted because a dam failure could result in damage to apartments located immediately downstream of the dam, damage to Montgomery Village Avenue across the dam crest, and damage to Watkins Mill Road located downstream of the dam. Hydrologic and hydraulic analyses indicate that the Lake Whetstone spillway can pass approximately 59 percent of the PMF without overtopping the dam. Since the analyses indicate that the spillway cannot pass the spillway design flood but can pass 50 percent of the PMF, the spillway capacity is rated as inadequate, but not seriously inadequate in accordance with Office of the Chief Engineers guidelines.

b. Adequacy of Information. The availability of detailed information on the design and construction of Lake Whetstone is considered adequate for the Phase I report.

c. Urgency. The following recommendations should be accomplished in a timely manner.

d. Need for Additional Data. At the present time, there is no need to obtain additional data or conduct additional investigations at Lake Whetstone.

7.2 Recommendations/Remedial Measures.

The following remedial measures are recommended to be accomplished by the Owner:

a. Repair the structural crack on the face of the north headwall of the outlet structure.

b. Remove the corrosive build-up which is partially obstructing the northern toe drain outlet.

c. Repair the erosion behind the south wingwall of the outlet structure.

d. Inspect the chamber of the drop inlet spillway to determine if there is a blockage to the left side of the twin box culvert, and remove any obstructions which exist.

e. Schedule formal periodic inspections of the dam embankment and appurtenant structures.

f. Develop a formal warning system to alert downstream residents in the event of emergencies.

APPENDIX A

VISUAL INSPECTION CHECKLIST

PHASE I

APPENDIX A
VISUAL INSPECTION CHECKLIST
PHASE I

Name of Dam: Lake Whetstone County (or City): Montgomery County State: Maryland

NDI ID. No.: MD- 53 Type of Dam: Earth Hazard Category: High

Date(s) Inspection: 6/26/80 & 7/15/80 Weather: Clear Temperature: 80's

Pool Elevation at Time of Inspection: 362.0' M.S.L. Tailwater at Time of Insp. 341± ' M.S.L.

Inspection Personnel:

J.D. Nauman

J. Wise

Review Inspection Personnel:

E.J. Zeigler

J.G. Mintiens

J.D. Nauman

J.D. Nauman Recorder

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Slight erosion at base of upstream slope directly above riprap at north end of dam. Erosion behind left wingwall of outfall conduit	Erosion behind left wingwall should be repaired
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal alignment satisfactory Vertical alignment varies 5 feet from end to end, lowest point 50± feet south of intersection of outfall conduit and embankment	
RIPRAP FAILURES	None	

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Satisfactory	Existing storm water drains adequately prevent surface runoff from eroding downstream embankment
ANY NOTICEABLE SEEPAGE	None	
STAFF GAGE AND RECORDER	None	
DRAINS	Toe drain along full length of dam. Outlets on either side of outfall conduit.	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Satisfactory except for crack on north half of headwall	
INTAKE STRUCTURE	15 Feet by 15 feet drop inlet with trash gate	Flow from north outfall conduit only, at time of inspection: drop inlet invert is two inches lower on north half
OUTLET STRUCTURE	Twin box culvert; 24 inch sewerline constructed through left culvert.	At time of inspection, only the right culvert was discharging - should check if any blockage to left culvert.
OUTLET CHANNEL	Small stilling pond, riprap erosion protection on banks of pond	
EMERGENCY GATE	Sluice gate submerged and not observed.	Sluice gate not operated during inspection. Periodically check sluice gate for proper operation.

VISUAL INSPECTION
PHASE I
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

VISUAL INSPECTION
PHASE I
INSTRUMENTATION

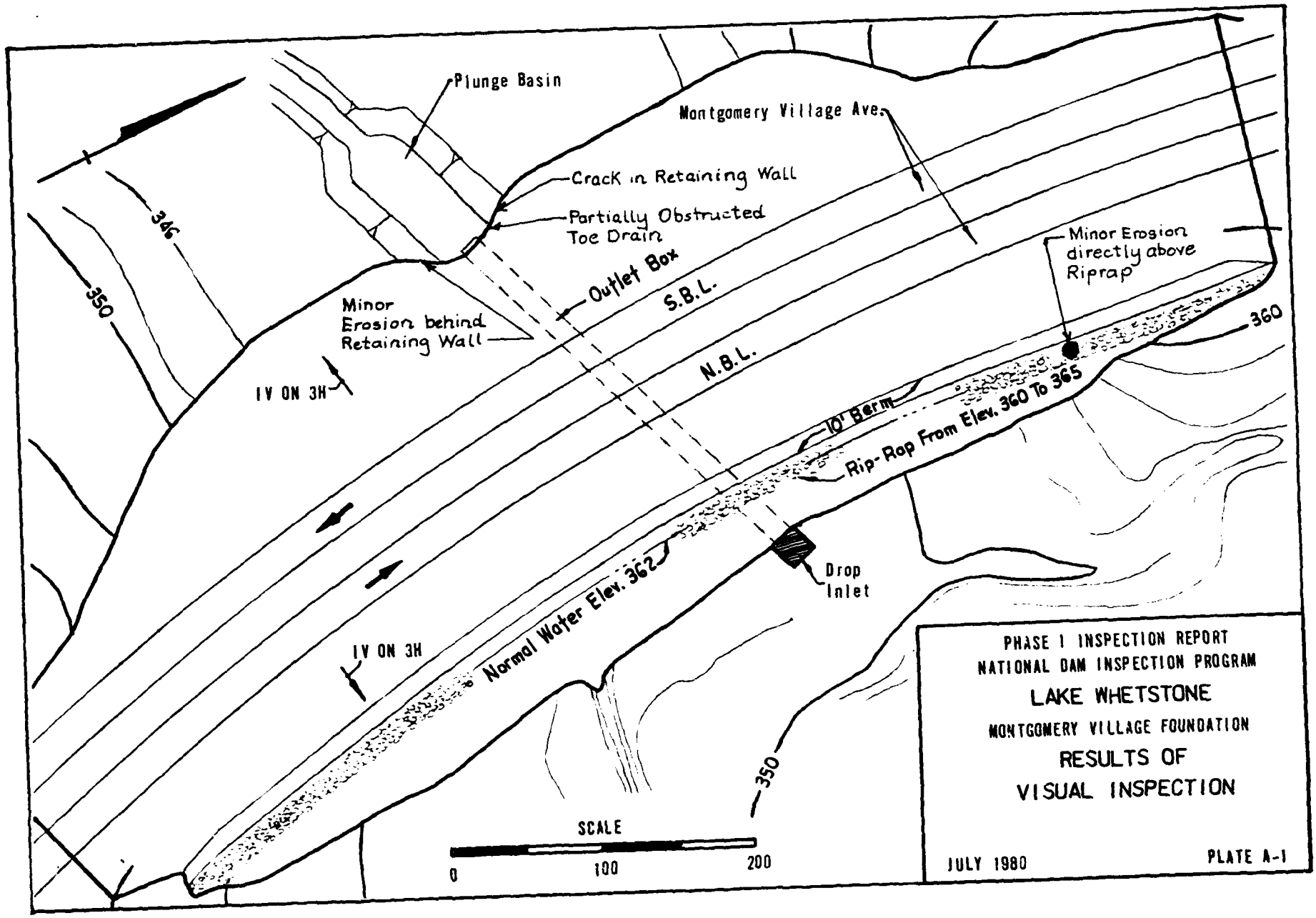
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER		

VISUAL INSPECTION
PHASE I
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Vegetated to shoreline, only minor erosion	
SEDIMENTATION	None	Owner indicated dredging is required approximately every 10 years
UPSTREAM RESERVOIRS	Recreational lake in residential area	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No signs of erosion, stilling pond has riprap erosion protection storm drains and outfall from adjacent pond (north side) enter stream	
SLOPES	Vegetated	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Apartments on either side of downstream channel, recreational area in flood-plain. Watkins Mill Road bridge downstream.	


Plunge Basin
Montgomery Village Ave.
Crack in Retaining Wall
Partially Obstructed Toe Drain
Outlet Box
S.B.L.
N.B.L.
Minor Erosion directly above Riprap
Minor Erosion behind Retaining Wall
346
350
360
1V ON 3H
10' Berm
Rip-Rap From Elev. 360 To 365
Drop Inlet
Normal Water Elev. 362
1V ON 3H
350
SCALE
0
100
200
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
LAKE WHETSTONE
MONTGOMERY VILLAGE FOUNDATION
RESULTS OF
VISUAL INSPECTION
JULY 1980
PLATE A-1

APPENDIX B

ENGINEERING DATA CHECKLIST

PHASE I

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Lake Whetstone

ID# NDI I.D. No Md-53

ITEM	REMARKS
AS-BUILT DRAWINGS	"Lake Whetstone, Montgomery Village, Maryland" by Greenhorne, O'Mara, Dewberry and Nealon, dated February 7, 1967, sheets 1 of 8 through 8 of 8.
REGIONAL VICINITY MAP	A regional vicinity map is included as Plate E-1.
CONSTRUCTION HISTORY	Lake Whetstone constructed in 1966.
TYPICAL SECTIONS OF DAM	A typical section of the embankment is shown on the As-Built drawings and is included as Plate E-2.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See As-Built drawings for outlet plans and details. See Design Report for discharge ratings.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	None
DESIGN REPORTS	"Design Report for Lake Whetstone, Montgomery Village, Montgomery County, Maryland," by Greenhorne, O'Mara, Dewberry, and Nealon dated March 10, 1966.
GEOLOGY REPORTS	Refer to Design Report
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Refer to Design Report
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Refer to Design Report

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

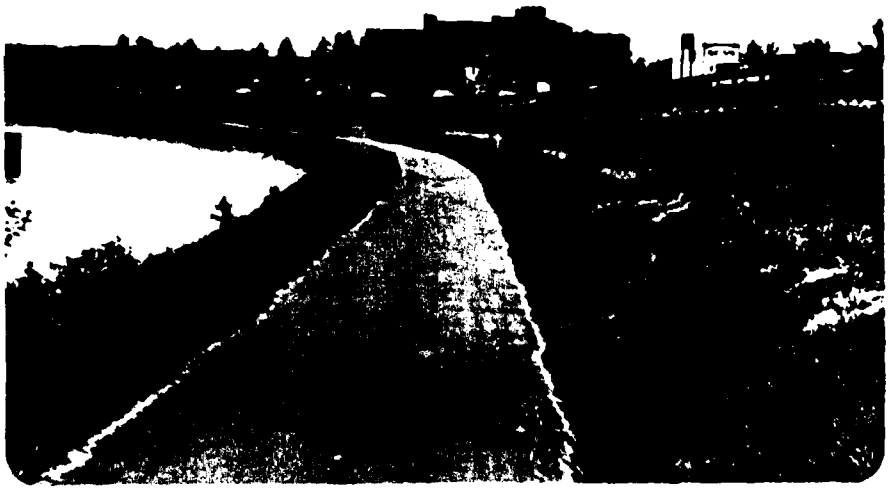
ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	UnKnown
MONITORING SYSTEMS	None
MODIFICATIONS	None
HIGH POOL RECORDS	None

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None
SPILLWAY PLAN SECTIONS DETAILS	Refer to As-Built drawings
OPERATING EQUIPMENT PLANS AND DETAILS	Refer to As-Built drawings.

APPENDIX C

PHOTOGRAPHS

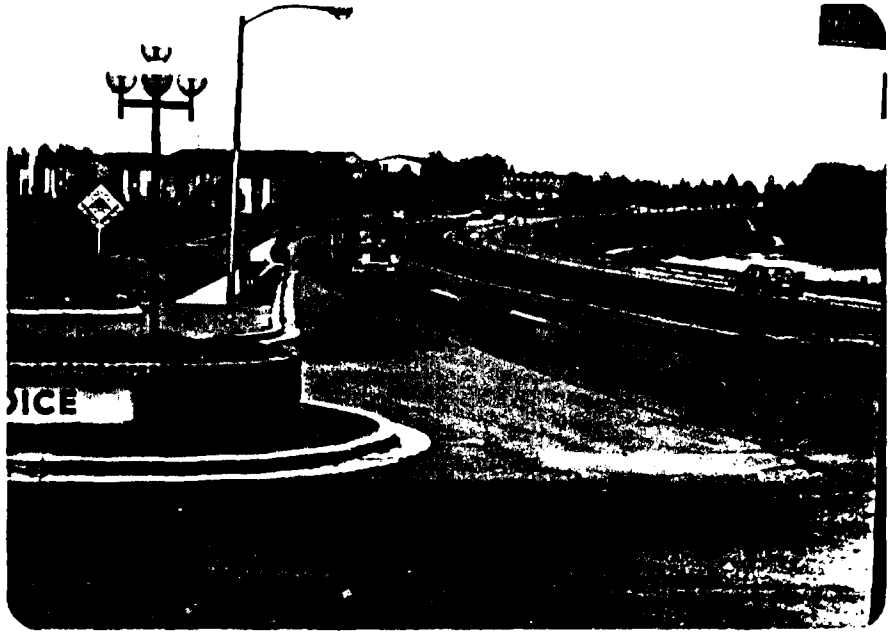


A. Upstream slope and walkway

B. Downstream slope of Dam

C. Drop inlet with trash grate

D. Riprap slope protection

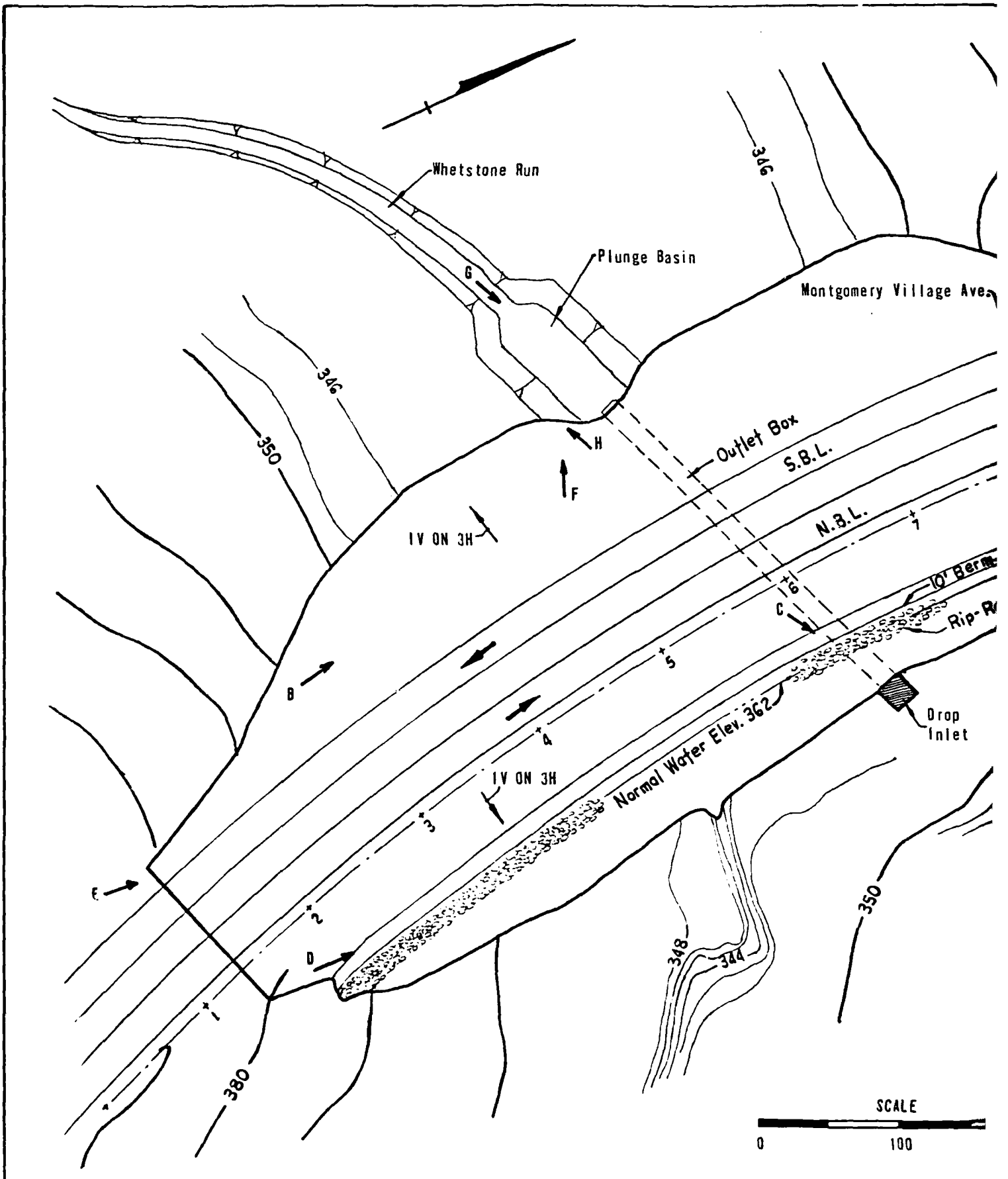


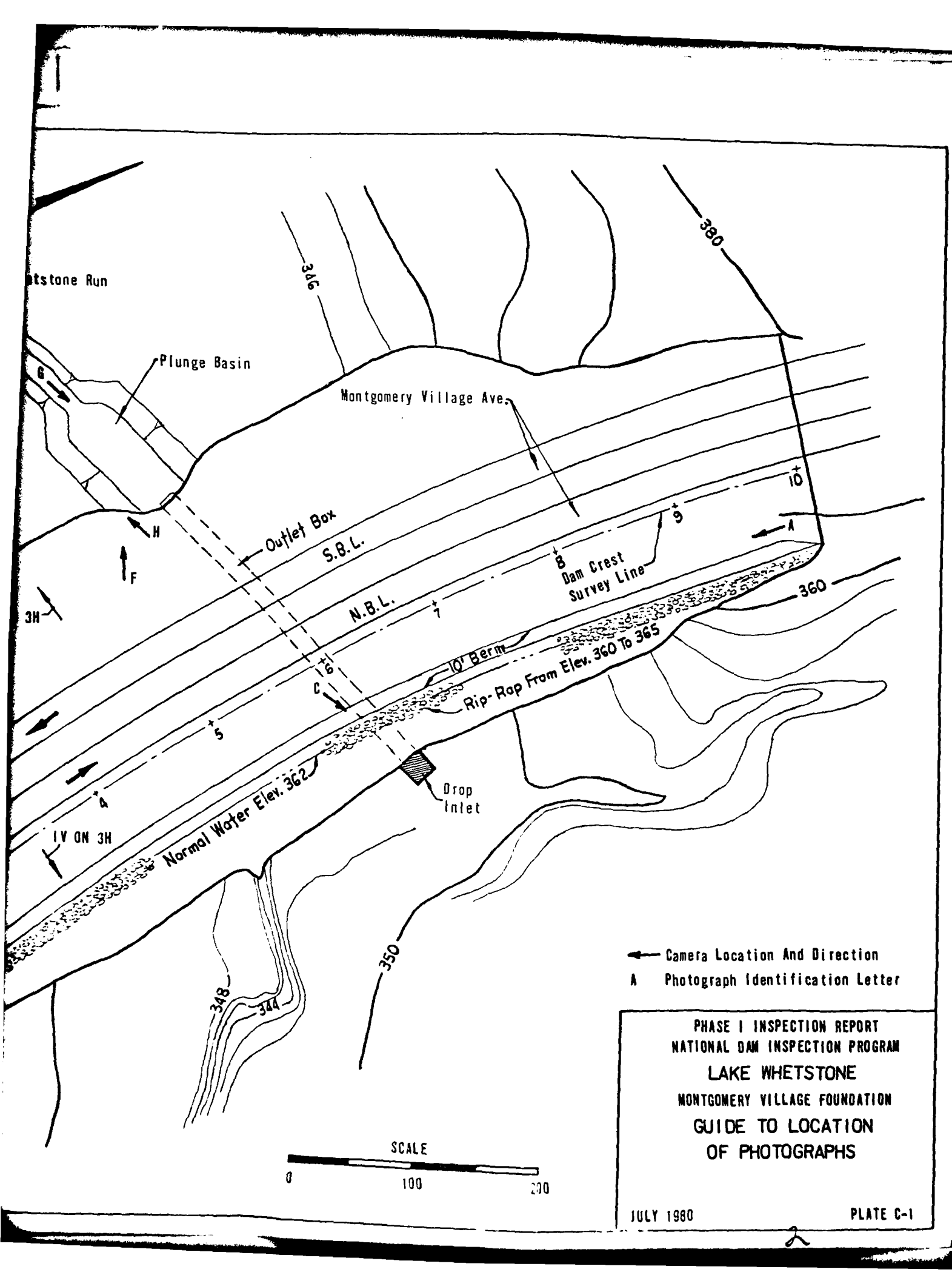
E. Montgomery Village Avenue over crest of dam

F. Plunge basin with riprap protection (foreground) and sediment control pond and townhouses north of Whetstone Run.

G. Outlet conduits and toe drains

H. Erosion behind left wingwall of outlet structure


Whetstone Run
Plunge Basin
Montgomery Village Ave.
346
350
348
344
380
Outlet Box
S.B.L.
N.B.L.
1V ON 3H
1V ON 3H
Normal Water Elev. 362
Drop Inlet
Rip-R
A
B
C
D
E
F
G
H
1
2
3
4
5
6
7
SCALE
0
100



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

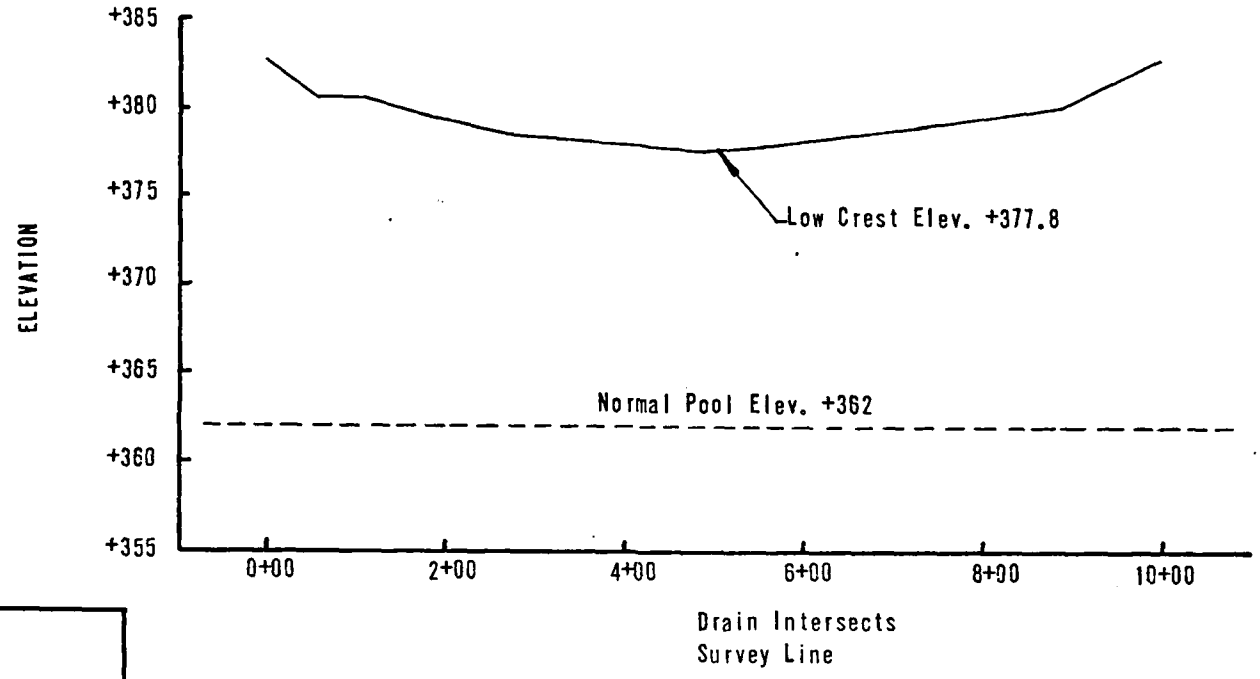
LAKE WHETSTONE

MONTGOMERY VILLAGE FOUNDATION

GUIDE TO LOCATION
OF PHOTOGRAPHS

JULY 1980

PLATE C-1



DAM CREST PROFILE

(LOOKING DOWNSTREAM)

NOTES:

DAM CREST SURVEY STATIONS ARE SHOWN ON PLATE C-1

DATUM ELEVATION IS INTERPOLATED FROM 50 SCALE CONTRACT DRAWINGS.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LAKE WHETSTONE

DAM CREST SURVEY

JULY 1980

PLATE C-2

APPENDIX D

HYDROLOGY AND HYDRAULICS

BASE DATA FOR DETERMINATION OF PROBABLE MAXIMUM FLOOD, UNIT HYDROGRAPH AND INFLOW HYDROGRAPHS

Name of Dam: Lake Whetstone NDI-ID MD 53

Unit Hydrograph Parameters

Watershed Drainage Area	3.34 sq. miles
Main Channel Length L	2.7 miles
Main Channel to Centroid Length, Lca	1.3 miles
Lag Time $tp = Ct\ (L \times Lca)^{0.3}$	3.64 hours
Basin Zone Location from Unit Hydrograph Coefficient Map	33
Basin Coefficients	
Cp_1	1.25
Ct_1	2.50

Inflow Hydrograph Parameters[1]

Base Flow at Start of Storm	1.5 c.f.s./sq. mile
Initial Rainfall Loss	1 inch
Uniform Rainfall Loss	0.05 inches/hour
Ratio of Peak Discharge Used to Compute Base Flow which Deviates from Hydrograph Falling Limb	0.05
Ratio of Recession Flow occuring 10 Tabulation Intervals Later	2.0

Rainfall Data[2]

Probable Maximum Precipitation Index for 24 hours and 200 square miles	24 inches
Percentage Adjustments of PMP for Drainage Area	
6 hour storm	112%
12 hour storm	123%
24 hour storm	132%

---

[1] Basin Coefficients and Hydrograph Data established by Corps of Engineers, Baltimore District

[2] Hydrometeorological Report 33, Corps of Engineers, 1956

Tabulation of Reservoir Area and Storage Vs. Elevation[1]

Name of Dam: Lake Whetstone NDI-ID MD-53

Pool Elevation feet above m.s.l.	Surface[1] Area acres	Reservoir[1] Storage acre-feet
348	0	0
350	3.2	3.2
352	5.1	11.5
354	8.3	24.9
356	12.0	45.2
358	15.7	72.9
360	20.7	114.6
362	26.6	166.6
364	31.4	224.6
366	36.0	292.0
368	41.5	369.5
370	47.4	458.4
372	53.6	559.4
374	60.0	673.0
374.3 (Maximum Flood Pool)	61	692
376	66.6	799.6
377.8 (Top of Dam)	76.5	930
380	88.6[2]	1092.6[2]
400	178.0[2]	3495[2]

[1] Source: Design Report - Lake Whetstone Montgomery Village, Greenhorne, O'Mara, Dewberry and Nealson, 10 March 1966

[2] Computed by Rummel, Klepper and Kahl

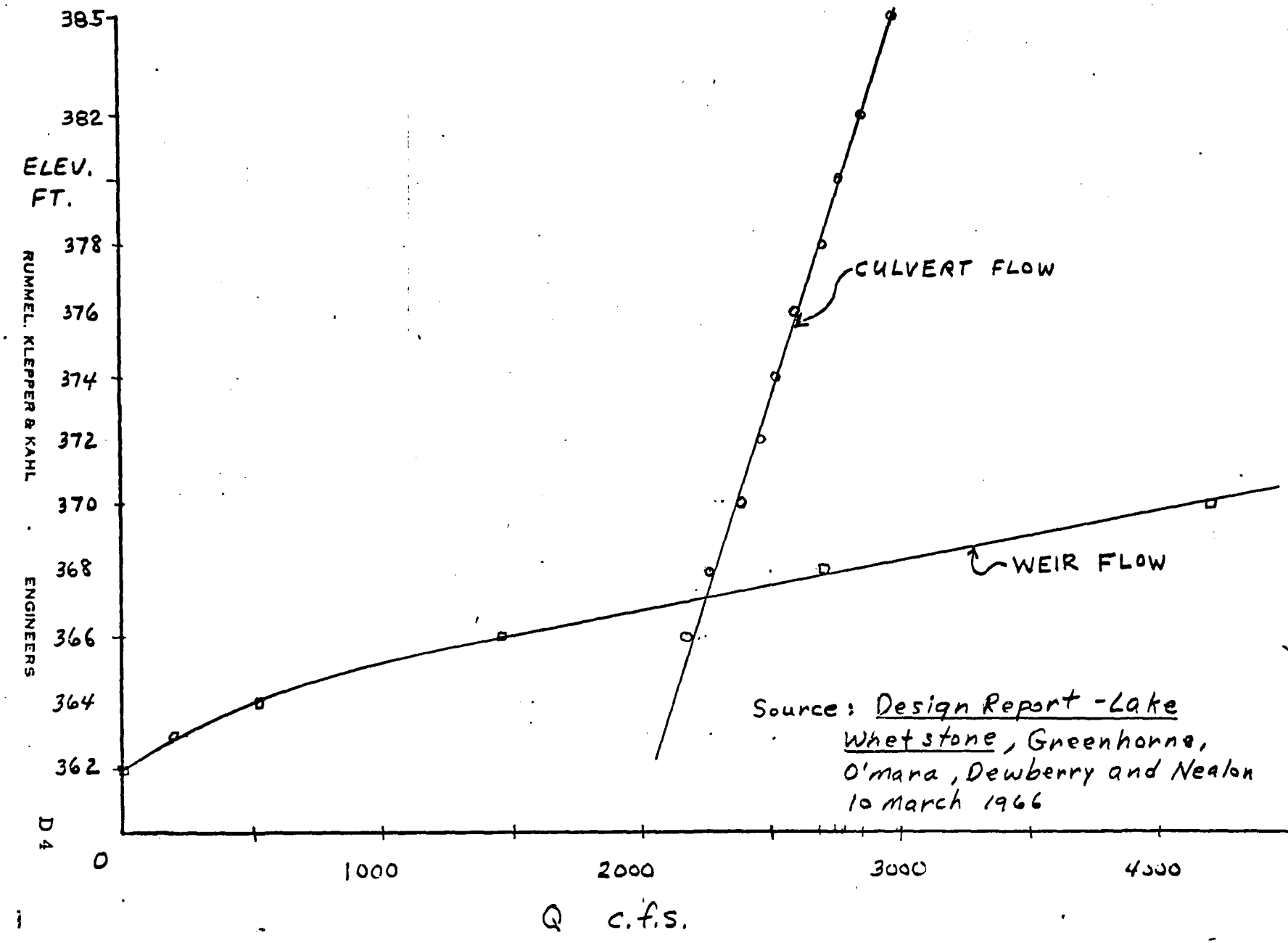
Spillway/Outlet Rating Curves[1]

Name of Dam: Lake Whetstone NDI-ID MD-53

Pool Elevation feet above m.s.l.	Weir Control c.f.s.	Conduit Control c.f.s.	Spilling Discharge c.f.s.
362	0		0
363	186		186
364	526		526
366	1488	2200	1488
368	2734	2250	2250
370	4204	2400	2400
372		2450	2450
374		2550	2550
374.8		2570	2570
376		2600	2600
378		2730	2730
380		2800[2]	2800[2]
380.1		2803[2]	2803[2]
382		2850[2]	2850[2]
385		2975[2]	2975[2]

[1] Source: Design Report - Lake Whetstone Montgomery Village, Greenhorne, O'Mara, Dewberry and Nealon, 10 March 1966

[2] Computed by Rummel, Klepper & Kahl



RUMMEL, KLEPPER & KAHL · ENGINEERS

D 4

BY _____ DATE _____

CHKD. BY _____ DATE _____

Lake Whetstone

Outlet Structure Rating Curve

JOB NO. 552-21-52

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  06 FEB 80
**********
    1                 A1       SNYDER UNIT HYDROGRAPH,FLOOD ROUTING AND DAM OVERTOPPING ANALYSES FOR
    2                 A2       20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% AND 100% PMF AT LAKE WHETSTONE DAM.
    3                 A3       NDI-I.D. MD53   COMM NO. 580-21-5D
    4                 B    150      0      15       0       0       0       0       0      -4       0
    5                 B1     5
    6                 J      1      9       1
    7                 J1   0.2    0.3    0.4     0.5     0.6     0.7     0.8     0.9     1.0
    8                 K      0      1                      0       0       1       0
    9                 K1       CALCULATION OF SNYDER INFLOW HYDROGRAPH TO LAKE WHETSTONE
   10                 M      1      1    3.34              0       0                       1
   11                 P      0     24     112     123     132
   12                 T                                                     1.0    0.05
   13                 W   3.64   1.25
   14                 X   -1.5  -0.05     2.0
   15                 K      1      2
   16                 K1       ROUTED FLOWS THROUGH LAKE WHETSTONE RESERVOIR
   17                 Y                             1       1
   18                 YI     1                                      166.6      -1
   19                 Y4   362    363     364     365     366     367     368     370     372     374
   20                 Y4   376    378     380     382     385
   21                 Y5     0    186     526     925    1488    2125    2250    2400    2450    2550
   22                 Y5  2600   2730    2800    2850    2975
   23                 $S     0    3.2    11.5    24.9    45.2    72.9   114.6   166.6   224.6     292
   24                 $S 369.5  458.4   559.4     673   799.6     930  1092.6    3495
   25                 $E   348    350     352     354     356     358     360     362     364     366
   26                 $E   368    370     372     374     376   377.8     380     400
   27                 $$   362
   28                 $D 377.5   2.63     1.5      50
   29                 $L    50    250     450     650     850    1000
   30                 $V 377.8  378.0   378.3   379.5   380.0   381.5
   31                 K     99
```

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 06 FEB 80
****

SNYDER UNIT HYDROGRAPH, FLOOD ROUTING AND DAM OVERTOPPING ANALYSES FOR
20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% AND 100% PMF AT LAKE WHETSTONE DAM.
NDI-I D MD53 COMM NO. 580-21-5D

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	15	0	0	0	0	0	-4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF SNYDER INFLOW HYDROGRAPH TO LAKE WHETSTONE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	3.34	0.00	3.34	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	24.00	112.00	123.00	132.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 3.64 CP=1.25 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 28 END-OF-PERIOD ORDINATES, LAG= 3.62 HOURS, CP= 0.76 VOL= 1.00

43.	121.	180.	222.	257.	288.	315.	341.	364.	386.
407.	427.	446.	463.	465.	450.	431.	411.	391.	369.
346.	321.	293.	264.	230.	190.	137.	57.		

0 END-OF-PERIOD FLOW

MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO. DA	HR. MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	25.34	23.49	1.86	204601
										(644.)	(597.)	(47.)	(5793.65)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH LAKE WHETSTONE RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	0	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	167.	-1

STAGE	362.00	363.00	364.00	365.00	366.00	367.00	368.00	370.00	372.00	374.00
	376.00	378.00	380.00	382.00	385.00					
FLOW	0.00	186.00	526.00	925.00	1488.00	2125.00	2250.00	2400.00	2450.00	2550.00
	2600.00	2730.00	2800.00	2850.00	2975.00					
CAPACITY=	0.	3.	12.	25.	45.	73.	115.	167.	225.	292.
	370.	458.	559.	673.	800.	930.	1093.	3495.		
ELEVATION=	348.	350.	352.	354.	356.	358.	360.	362.	364.	366.
	368.	370.	372.	374.	376.	378.	380.	400.		

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
362.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
377.5	2.6	1.5	50.

CREST LENGTH	50.	250.	450.	650.	850.	1000.
AT OR BELOW ELEVATION	377.8	378.0	378.3	379.5	380.0	381.5

PEAK OUTFLOW IS 1532. AT TIME 19.50 HOURS

PEAK OUTFLOW IS 2187. AT TIME 19.75 HOURS

PEAK OUTFLOW IS 2421. AT TIME 20.50 HOURS

PEAK OUTFLOW IS 2569. AT TIME 21.00 HOURS

PEAK OUTFLOW IS 2962. AT TIME 21.25 HOURS

PEAK OUTFLOW IS 4707. AT TIME 20.25 HOURS

PEAK OUTFLOW IS 5958. AT TIME 19.75 HOURS

PEAK OUTFLOW IS 7044. AT TIME 19.25 HOURS

PEAK OUTFLOW IS 7888. AT TIME 19.25 HOURS

********** ********** ********** ********** **********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.20	RATIO 2 0.30	RATIO 3 0.40	RATIO 4 0.50	RATIO 5 0.60	RATIO 6 0.70	RATIO 7 0.80	RATIO 8 0.90	RATIO 9 1.00
HYDROGRAPH AT	1	3.34	1	1600.	2400.	3200	4001	4801.	5601.	6401.	7201.	8001.
	(	8.65)	(	45.31)(	67.97)(	90.63)(	113.28)(	135.94)(	158.60)(	181.25)(	203.91)(	226.57)
ROUTED TO	2	3.34	1	1532.	2187.	2421	2569	2962.	4707.	5958.	7044.	7888.
	(	8.65)	(	43.39)(	61.92)(	68.55)(	72.76)(	83.88)(	133.29)(	168.71)(	199.47)(	223.36)

SUMMARY OF DAM SAFETY ANALYSIS

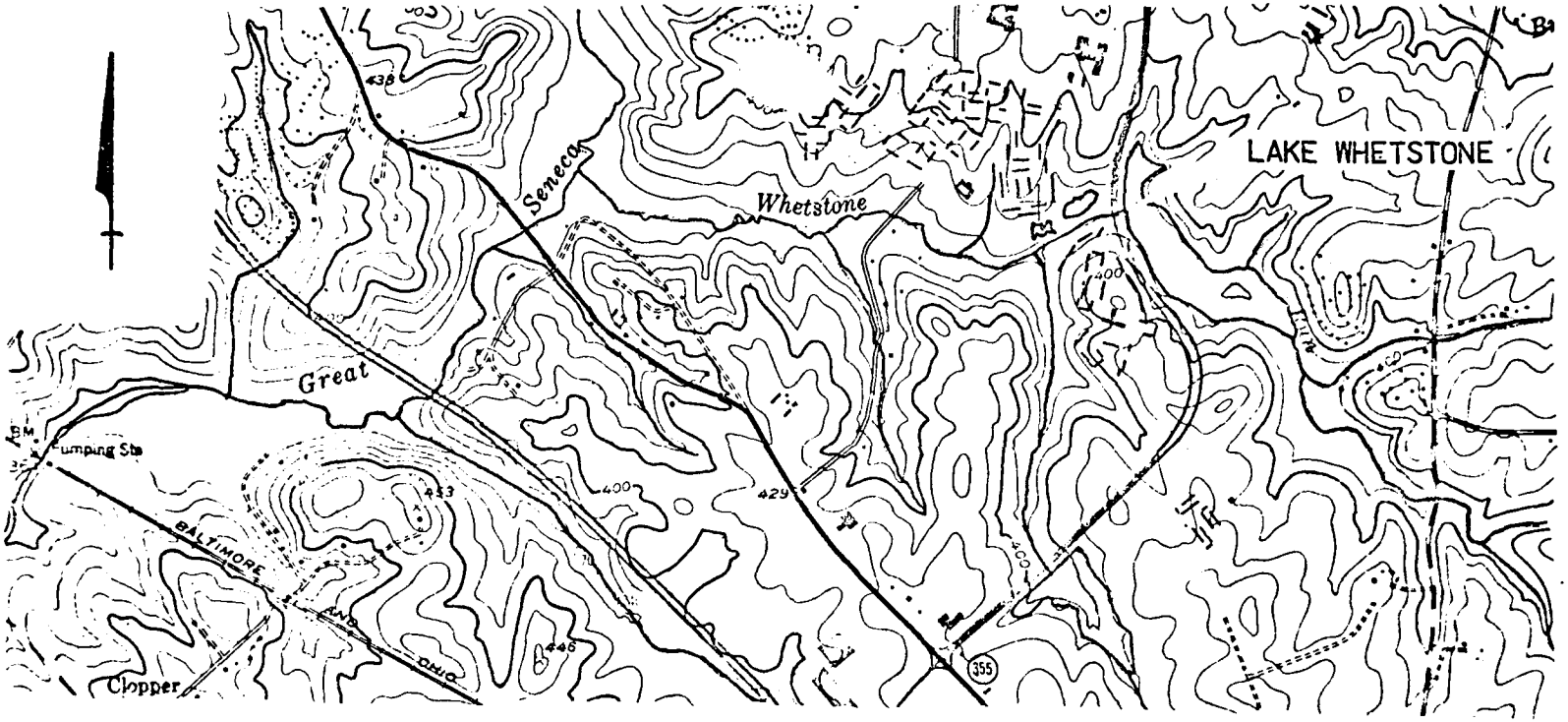
PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	362.00	362.00	377.50
STORAGE	167.	167.	908.
OUTFLOW	0.	0.	2698.

RATIO OF PMF	MAXIMUM RESERVOIR W S ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	366.07	0.00	295.	1532.	0.00	19.50	0.00
0.30	367.49	0.00	350.	2187.	0.00	19.75	0.00
0.40	370.83	0.00	500.	2421.	0.00	20.50	0.00
0.50	374.78	0.00	722.	2569.	0.00	21.00	0.00
0.60	378.27	0.77	965.	2962.	2.25	21.25	0.00
0.70	379.18	1.68	1032.	4707.	3.50	20.25	0.00
0.80	379.59	2.09	1063.	5958.	4.25	19.75	0.00
0.90	379.88	2.38	1084.	7044.	5.00	19.25	0.00
1.00	380.08	2.58	1102.	7888.	5.25	19.25	0.00

APPENDIX E

PLATES



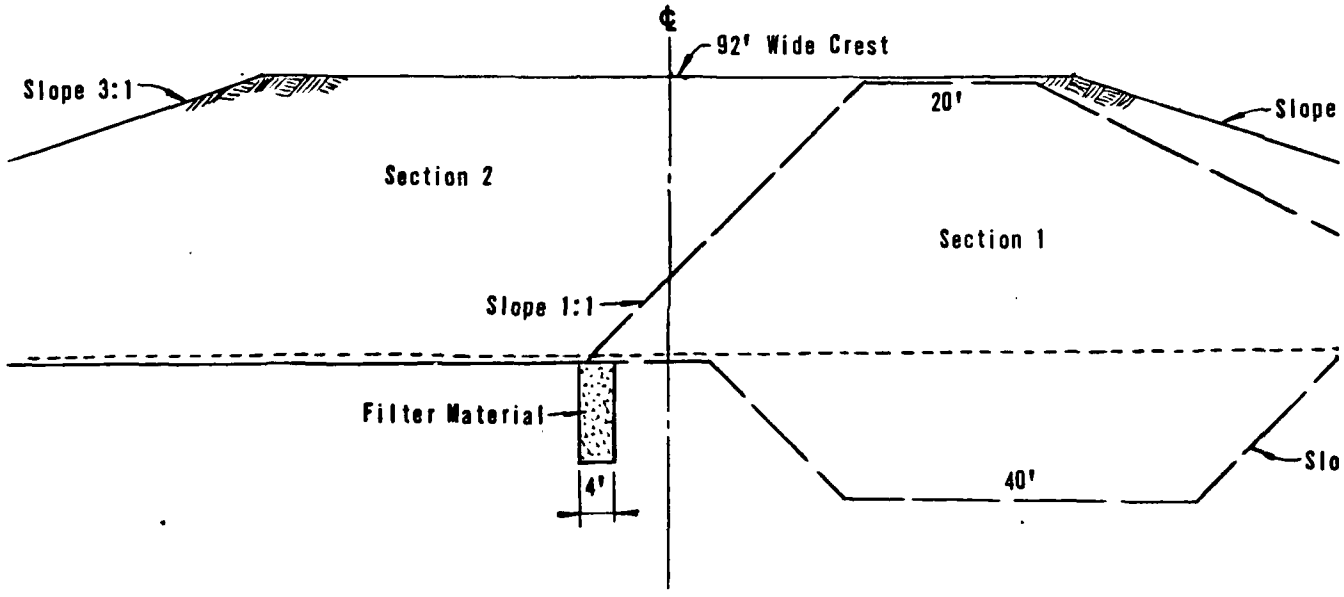
SCALE

0 ½ MI. 1 MI.

LAKE WHETSTONE

LOCATION MAP

PLATE E-1

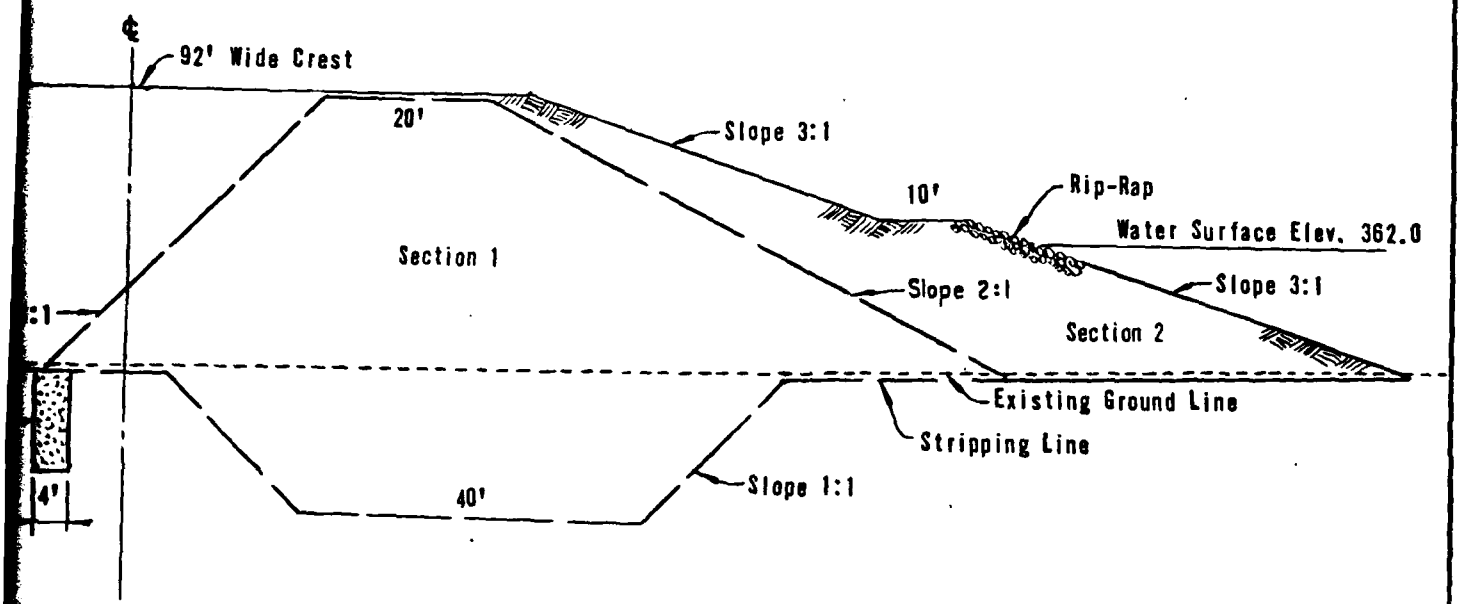


FILL MATERIAL

TYPE	REQUIREMENTS
Section 1	ML* (Plasticity Index From 6 to 10)
Section 2	ML* (Plasticity Index Less Than 6)

* Silt And Clay Defined By Unified Soil Classification System

Scale 1" = 20'



10)

6)

ied Soil Classification System

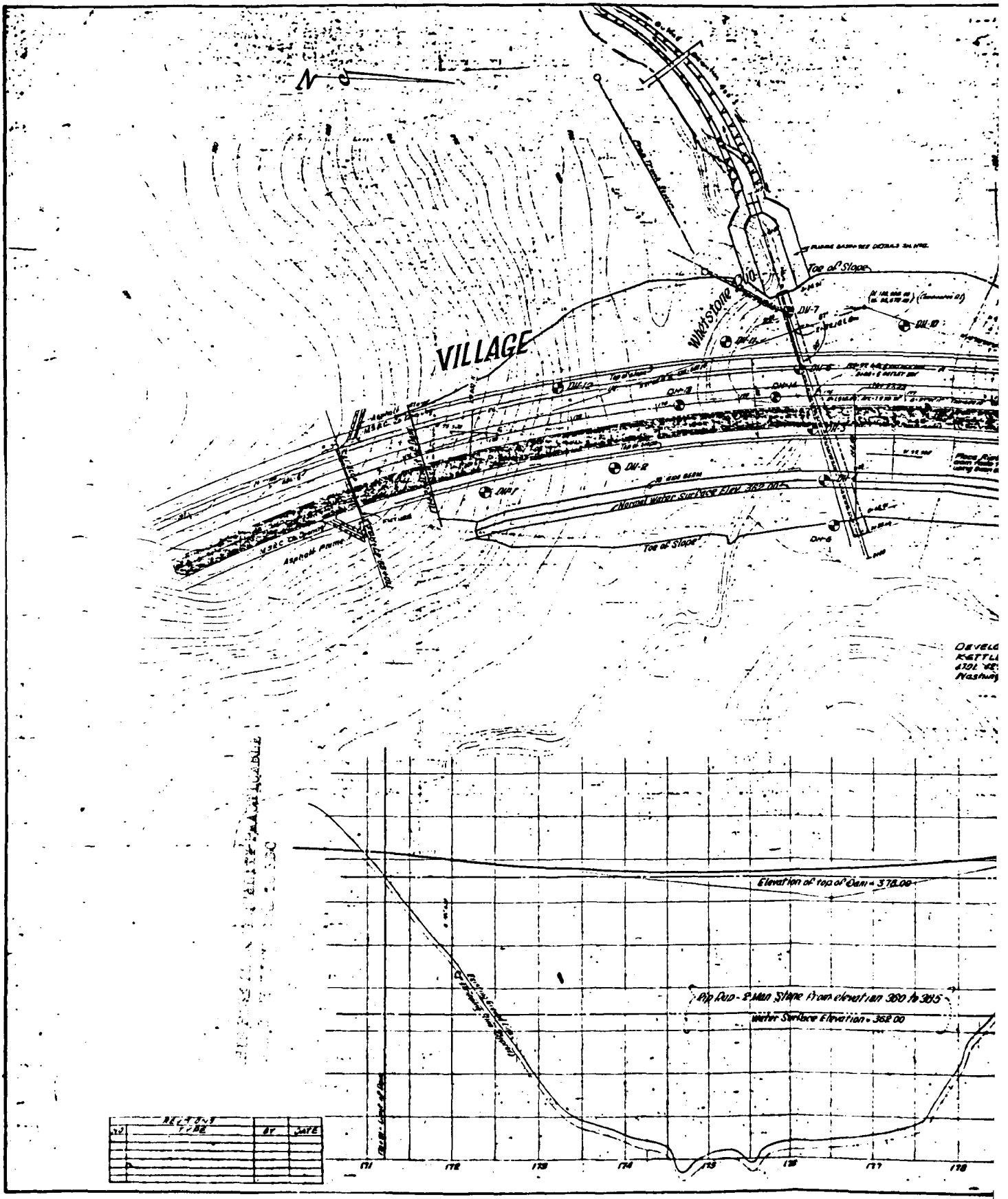
Scale 1" = 20'

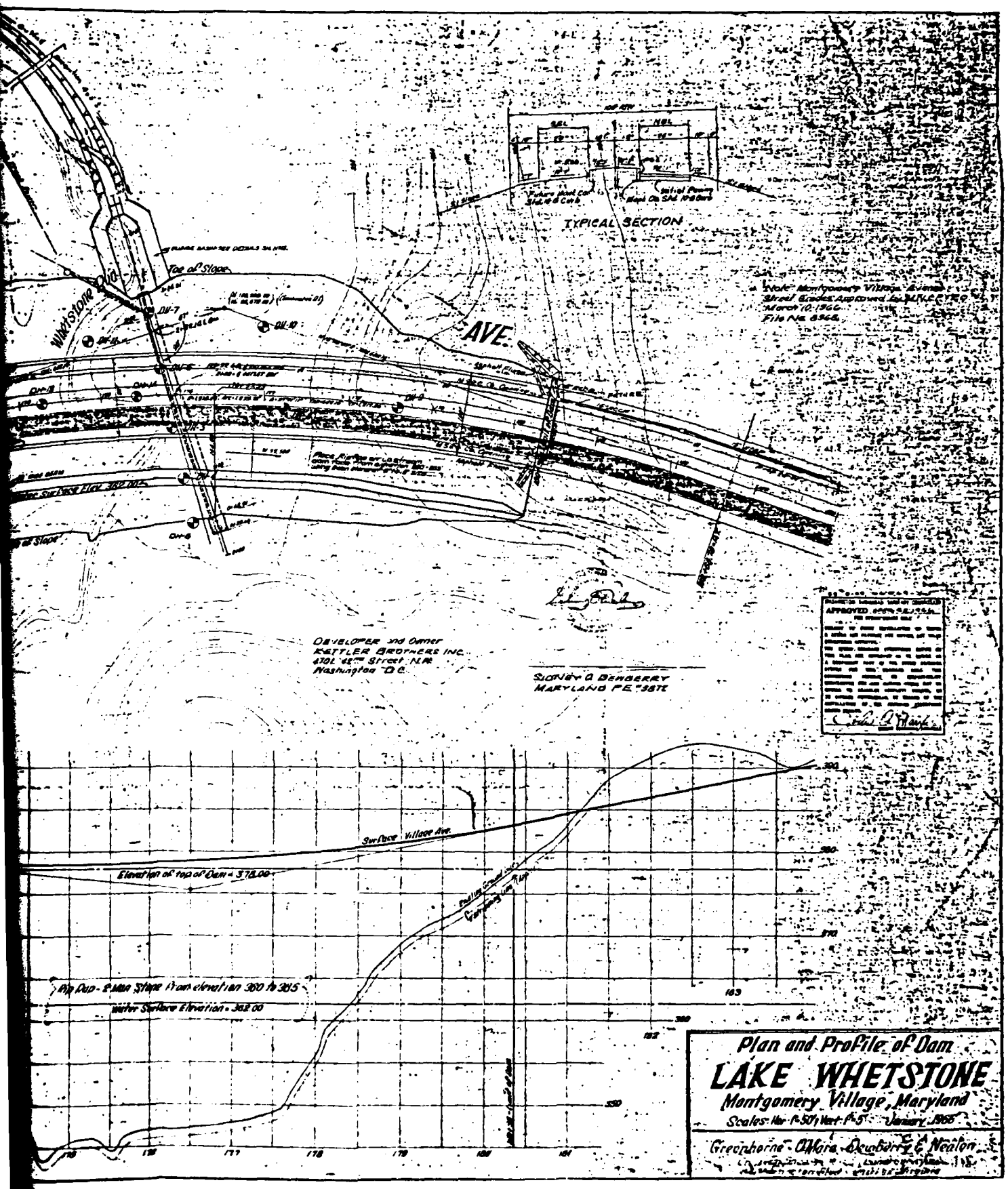
TYPICAL SECTION

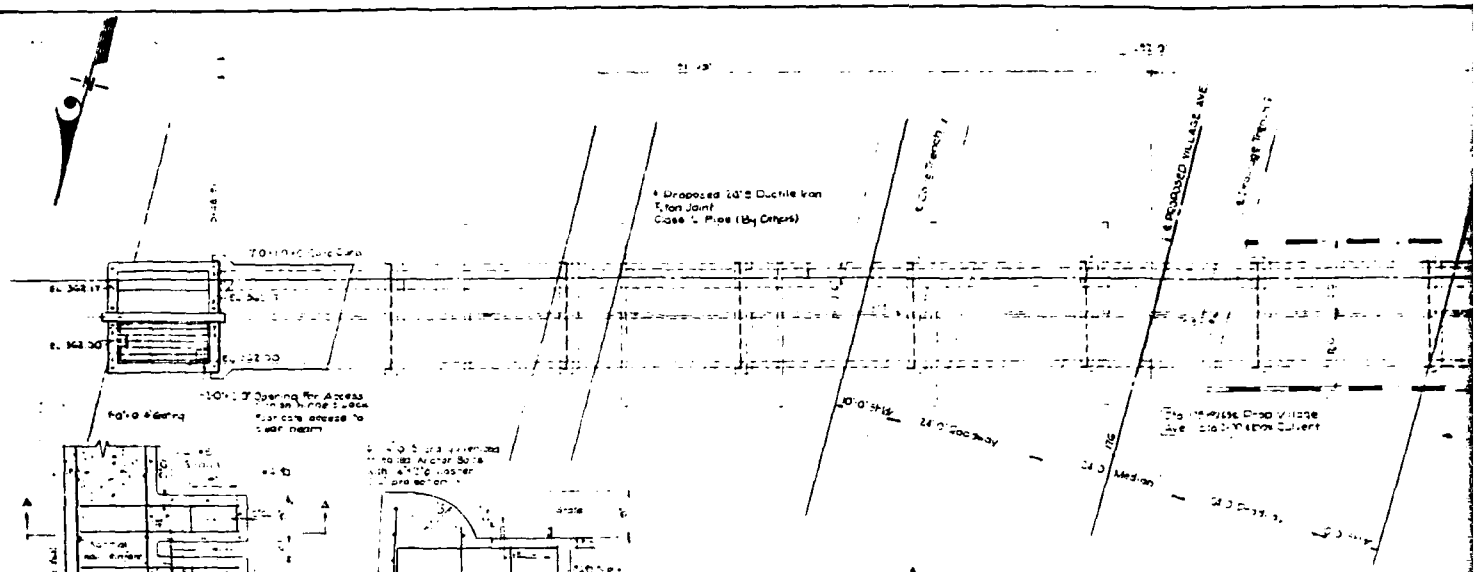
LAKE WHETSTONE

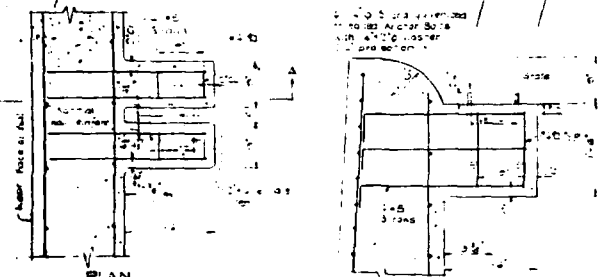
FROM AS BUILT DRAWING
DATED FEB. 7, 1967
SHEET NO. 4

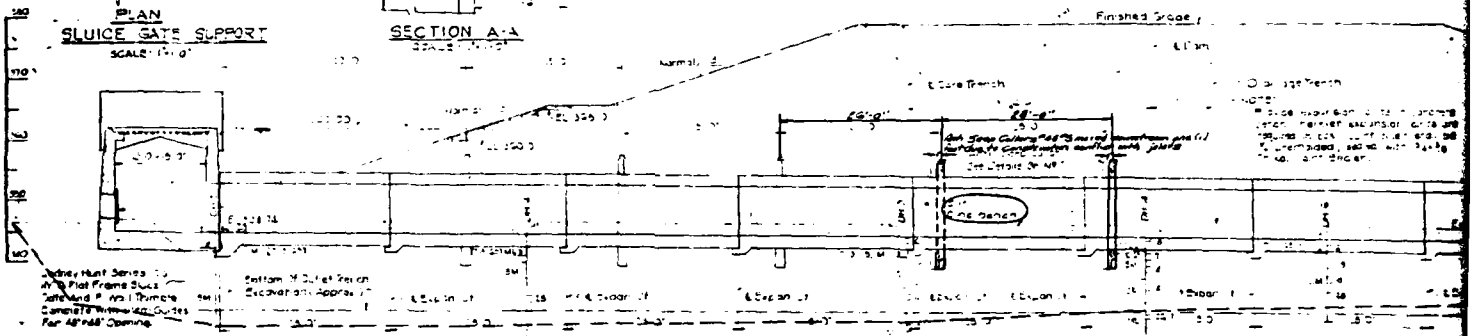
PLATE E-2

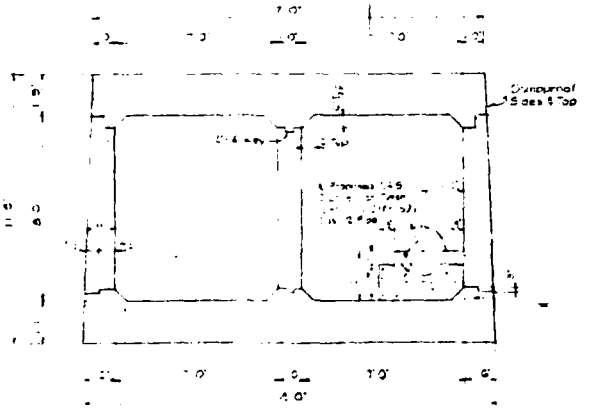

VILLAGE
Wilkstone Blvd.
Toe of Slope
Normal water Surface Elev. 362.00
Asphalt paving
Elevation of top of Dam = 378.00
Rip Rap - 3 Min Slope from elevation 360 to 365
Water Surface Elevation = 362.00

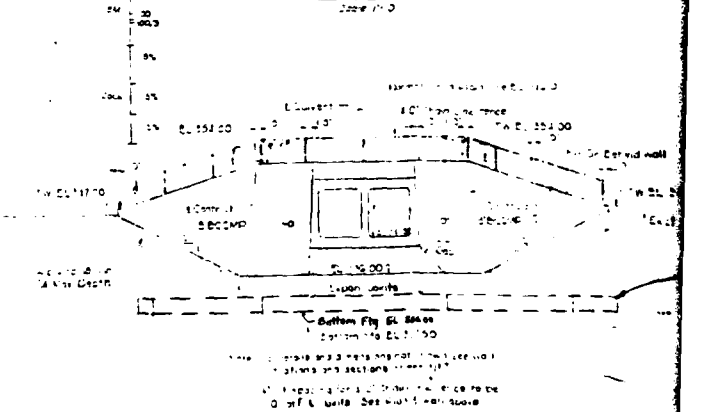

TYPICAL SECTION
WHETSTONE DRIVE
VILLAGE AVE.
Toe of Slope
Surface Village Ave.
Elevation of top of Dam = 378.00
Pip Dup - 8 Man Slope from elevation 360 to 385
Water Surface Elevation = 382.00
DEVELOPER and Owner
KETTLER BROTHERS INC.
4701 41st Street N.W.
Washington D.C.
SIGNED D DENBERRY
MARYLAND PE "3811"
APPROVED
Plan and Profile of Dam
LAKE WHETSTONE
Montgomery Village, Maryland
Scales: Hor. 1"=50' Vert. 1"=5' January 1965
Greenhorne & O'Mara, Dewberry & Nealon

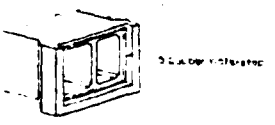

PROPOSED VILLAGE AVE
Median
PLAN

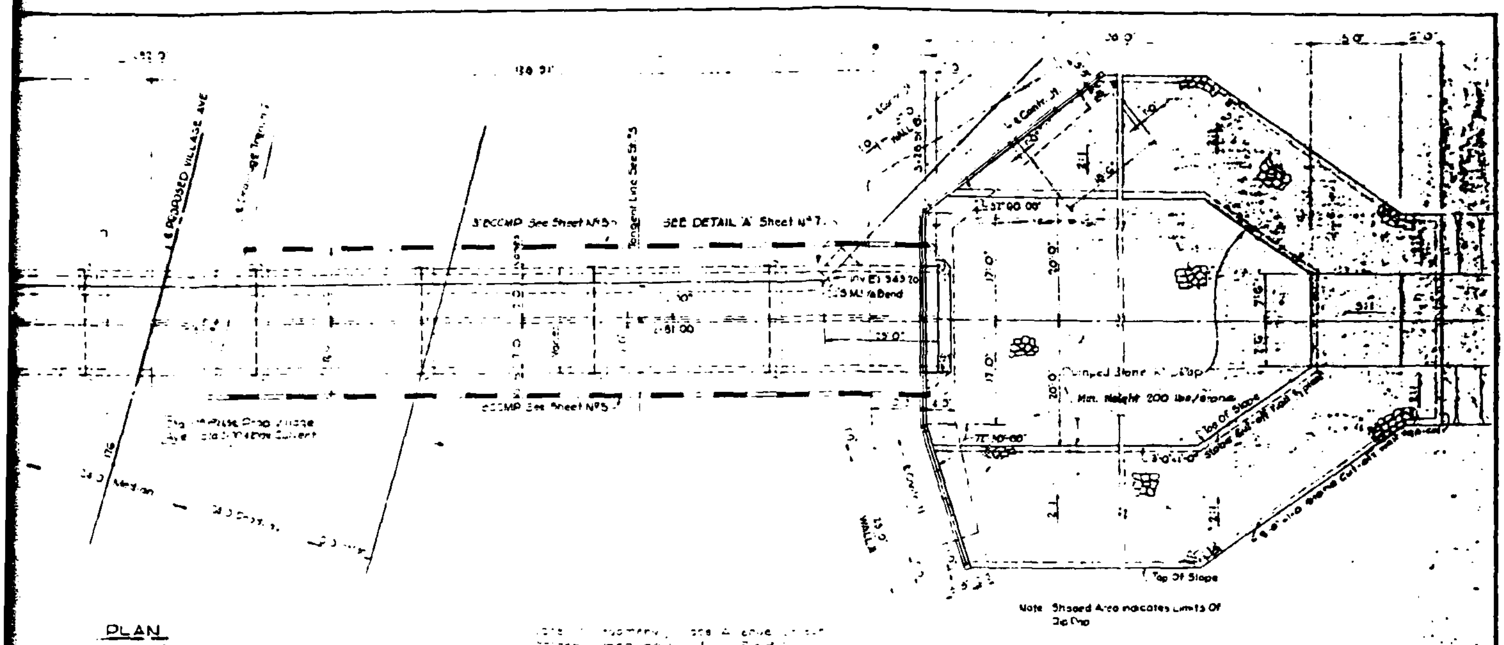

PLAN
SLUICE GATE SUPPORT
SECTION A-A


ELEVATION

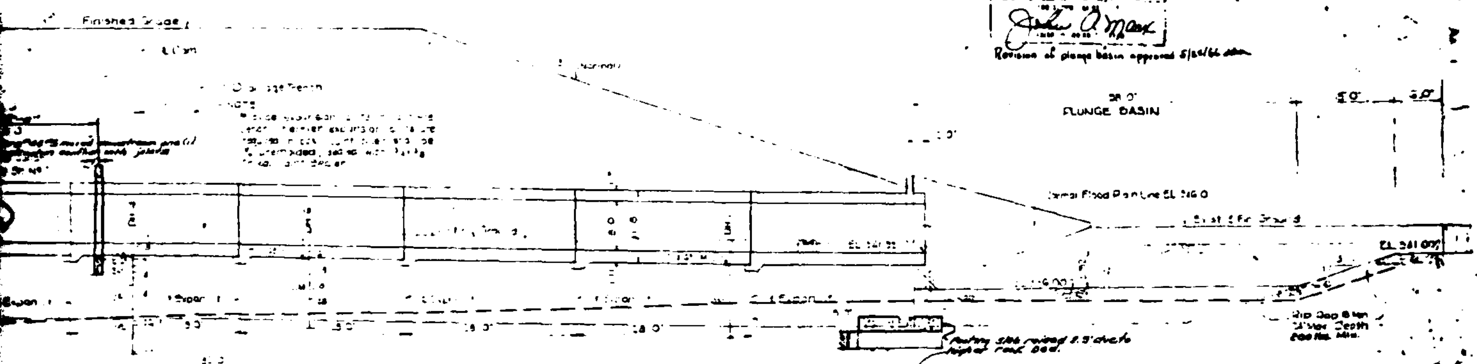

TYPICAL SECTION THRU BOX


TYPICAL SECTION AT OUTLET

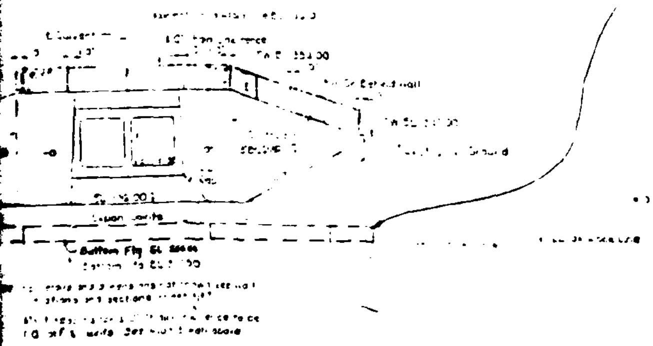

ISOMETRIC VIEW OF EXPANSION JOINT



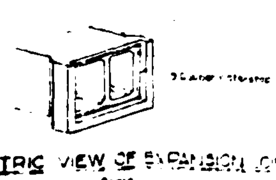
PLAN



ELEVATION



TYPICAL SECTION AT OUTLET



ISOMETRIC VIEW OF EXPANSION JOINT

APPROVED APRIL 18, 1966

Revision of plunge basin approved 5/24/66

GENERAL NOTES

Concrete: Fc = 3000 psi ... days. Portland Cement to be Type III with air-entrained admixture.

Reinforcing Steel: To be deformed bars of intermediate grade. Lap a min. of 24 bar diameters at all splices. Allowable fs = 20,000 psi. All reinf. steel to have 2" min clear cover except 3" for footings.

Chamfer: All exposed edges of concrete shall be chamfered 3/4" x 3/4" with milled chamfer strips.

Shop Drawings: Reinforcing & form details shall be submitted to the Engineer for approval prior to fabrication.

Dampproofing: Shall be applied to those portions of the outside surface of sidewalls, top of top slab, rear faces of walls that are in contact with earth & full face of all contraction joints.

Waterstop: Rubber waterstops shall be Williams. Splices shall be made with molded joints set in rubber cement.

Structural Steel: All gratings & structural steel shall be A-36 hot dipped galv. or else corrosive resistant steel equal to Bethlehems Mayari R.

INV. ELEVATION & JTS.	
STATIONS	ELEVATIONS
0+46.91	344.74
0+78.91	344.56
1+04.91	344.38
1+32.91	344.20
1+60.91	344.02
* 1+88.91	343.94
2+16.91	343.46
2+44.91	343.08
2+72.91	342.70
3+00.91	342.32
3+30.91	341.92

* 0.3 MAX CAMBER AT STA 1+89.91

SIDNEY O DEWBERRY
MARYLAND PE #3872

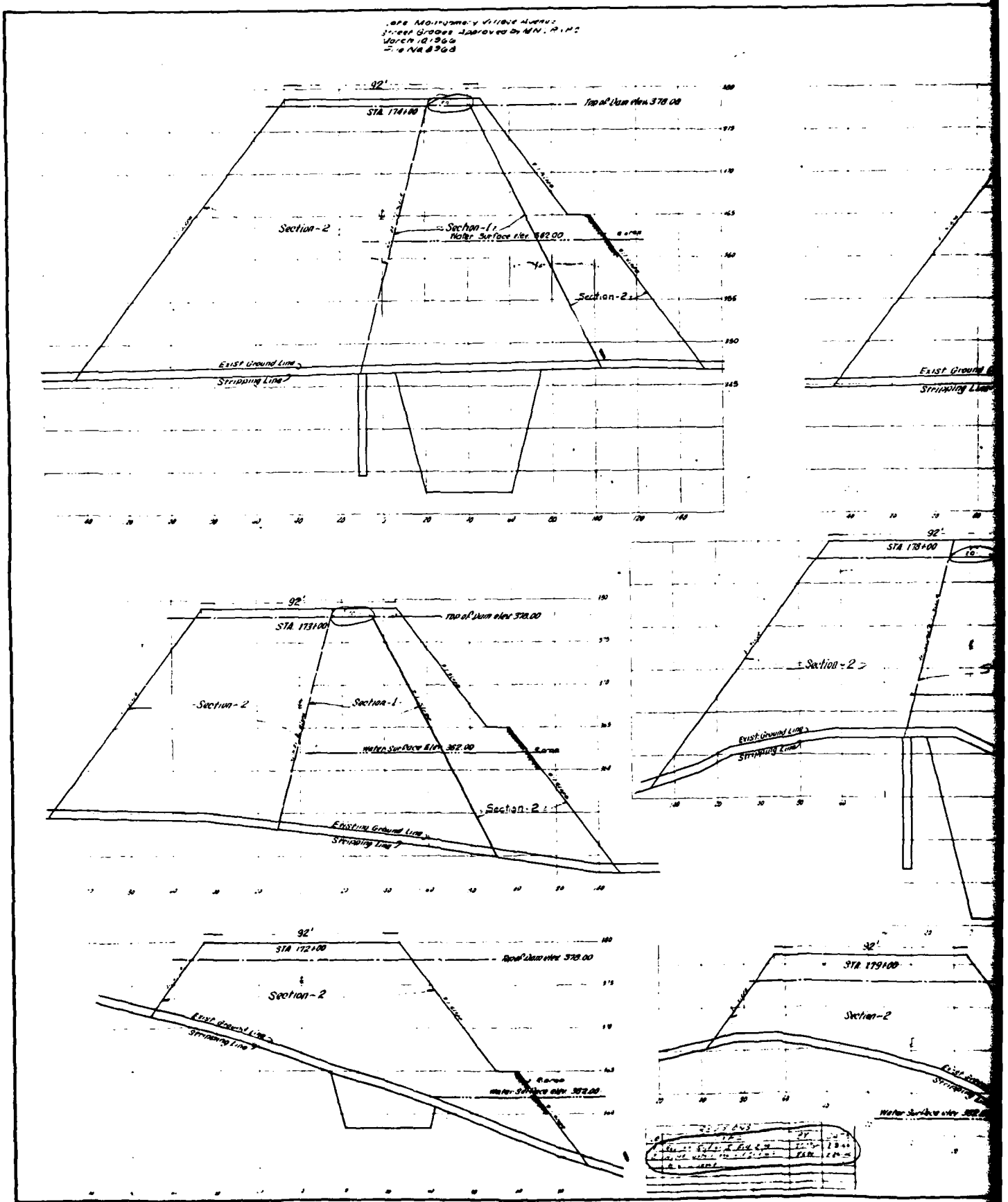
REVISIONS		
Sluice gate supports		5-5-66
Masking ...		
...		5-24-66

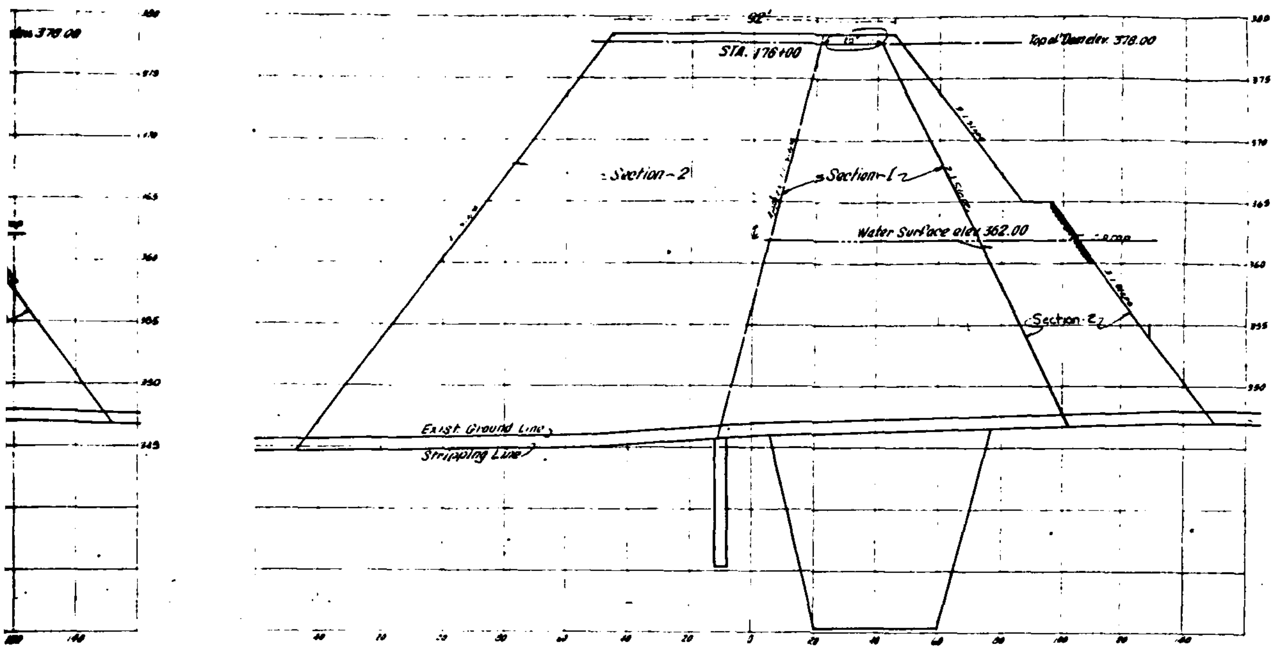
Plan and Profile Outlet Conduit
LAKE WHETSTONE
Montgomery Village, Maryland

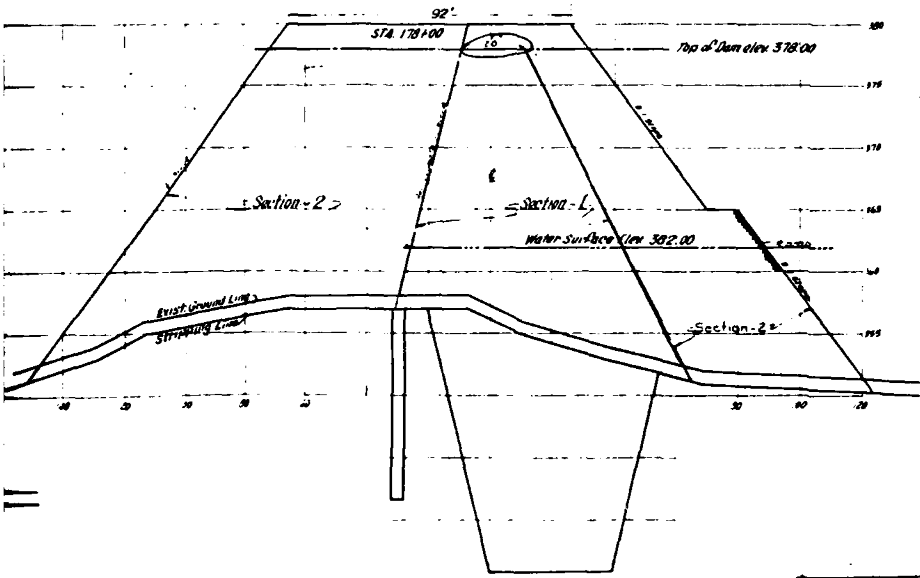
Greenhorne - O'Mara - Dewberry & Nealon
Civil Engineers Land Surveyors
8411 Arlington Blvd. Fairfax, Virginia

2

PLATE E-1


Lake Montgomery Village Manor
Street Grades Approved by MN-M-NPC
March 10, 1966
File No. 8368
92'
STA. 174+00
Top of Dam elev. 378.00
Section-2
Section-1
Water Surface elev. 362.00
Section-2
Exist. Ground Line
Stripping Line
92'
STA. 173+00
Top of Dam elev. 378.00
Section-2
Section-1
Water Surface Elev. 362.00
Section-2
Existing Ground Line
Stripping Line
92'
STA. 178+00
Section-2
Exist. Ground Line
Stripping Line
92'
STA. 172+00
Top of Dam elev. 378.00
Section-2
Exist. Ground Line
Stripping Line
Water Surface elev. 362.00
92'
STA. 179+00
Section-2
Exist. Ground Line
Stripping Line
Water Surface elev. 362.00





OWNER AND DEVELOPER
KETTLER BROTHERS INC
1701 32nd Street N.W.
Washington D.C.

SIDNEY O. DEWBERRY
MARYLAND PE #3372

NOTES

1. All earth fill will be compacted Class B-2 fill (See earth fill specifications). Compaction of earth fill will be performed using sheepsfoot rollers having a minimum contact pressure of 200 P.S.I.

   Section-1 Compacted fill – Class B-2 "ML" – Most Plastic (PI 6-10)

   Section-2 "ML" Less Plastic (PI < 6)

2. The boundaries of sections of Dam are approximate and the actual boundaries will be determined by the engineer during construction.

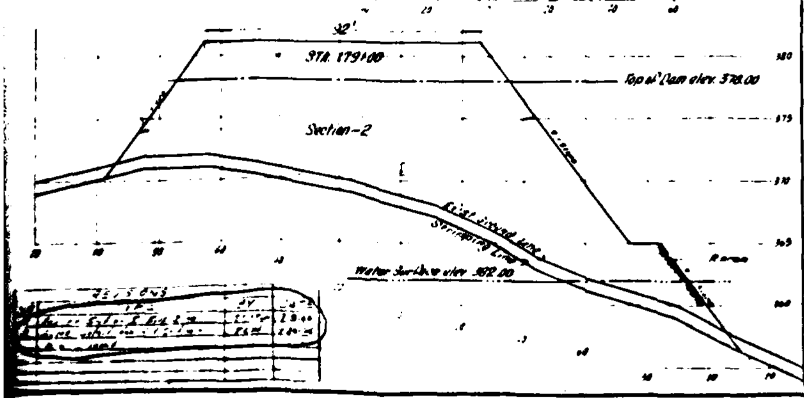
3. Compacted earth fill will be placed within the following limits of moisture content.

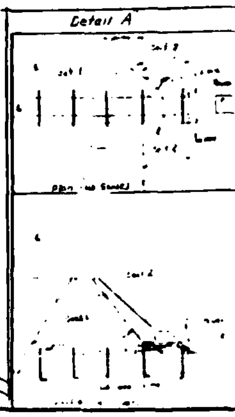
   Section-1: -2 to +2 percent of optimum moisture at the specified density for the materials.

   Section-2: -1 to +3 percent of optimum moisture at the specified density for the materials.

4. [illegible] along upstream face of Dam between elevation [illegible]

5. At Box Culvert Section 1 material must be extended beyond 1st Anti-seep collar (downstream from tower) to a height of 2' min. above (10' min. horizontally from the Anti-seep collars (See Detail "A" this sheet)





Dam Cross Sections

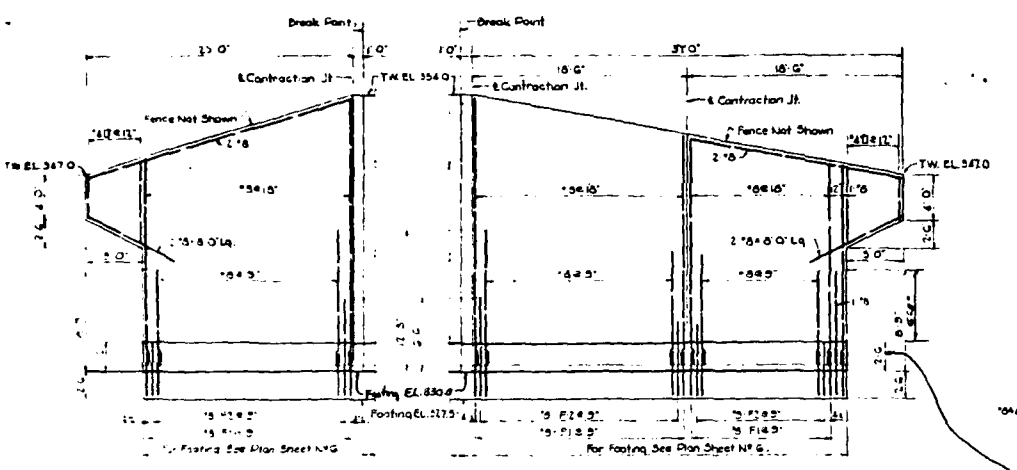
LAKE WHETSTONE

Montgomery Village, Maryland

Scale: Hor: 1" = 20' Ver: 1" = 5' January, 1968

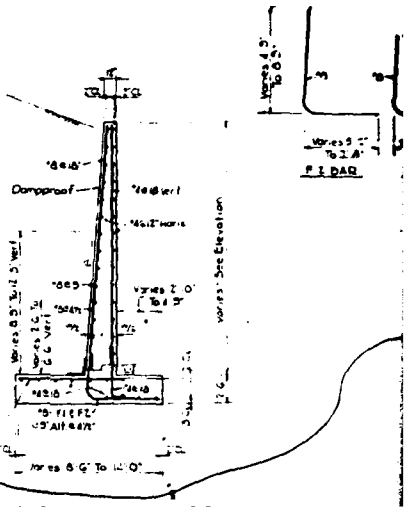
Greenhorne - O'Mara - Dewberry & Nealon
Civil Engineers Land Surveyors
9411 Arlington Blvd., Fairfax, Virginia

2

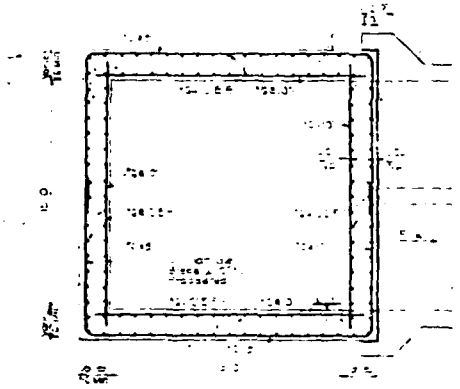


ELEVATION - WALL A

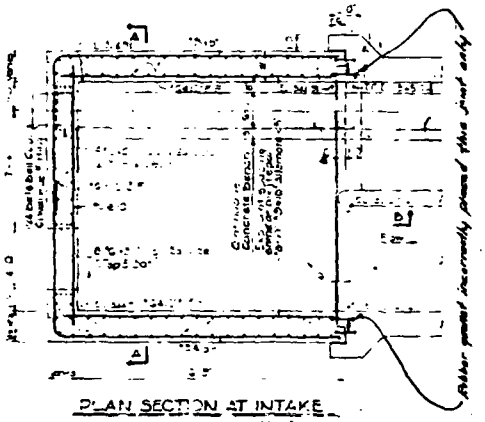
ELEVATION - WALL B



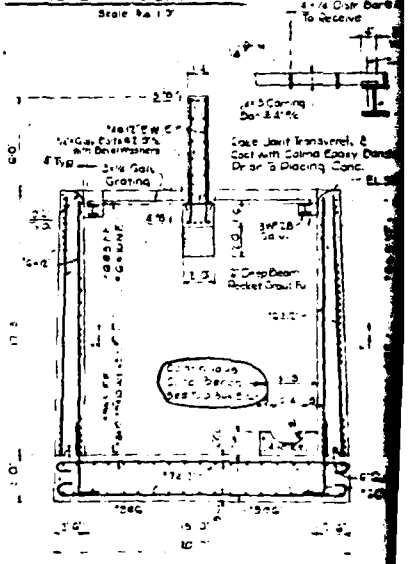
TYPICAL WALL SECTION



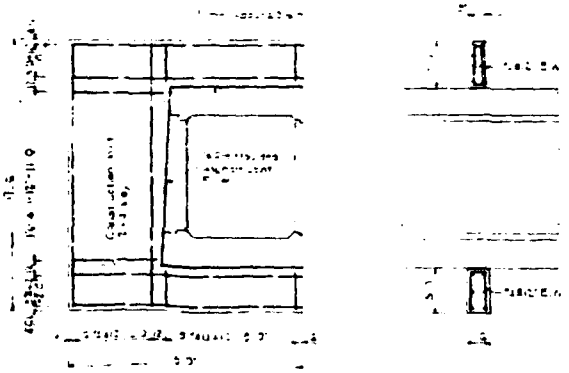
PLAN SECTION AT INTAKE



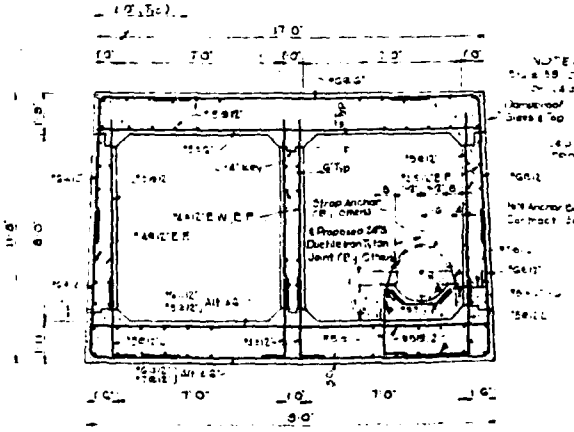
PLAN SECTION AT INTAKE



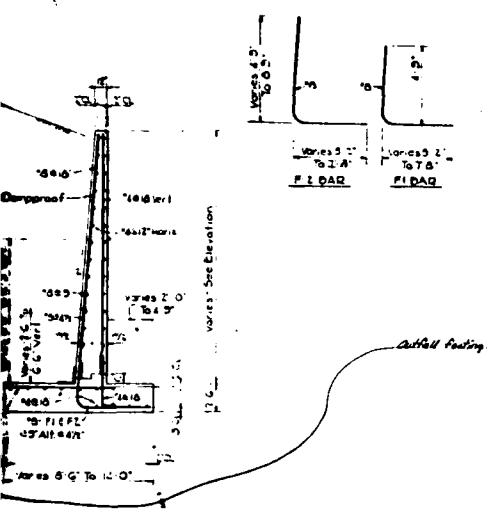
SECTION A A



ANTI - SEEP COLLAR DETAIL

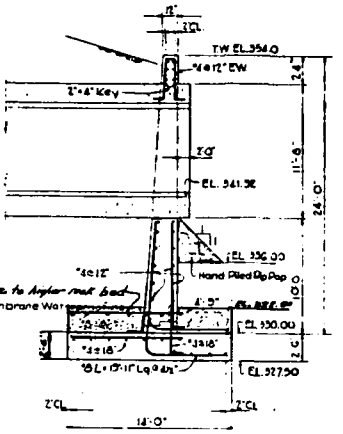


TYPICAL SECTION THRU BOX



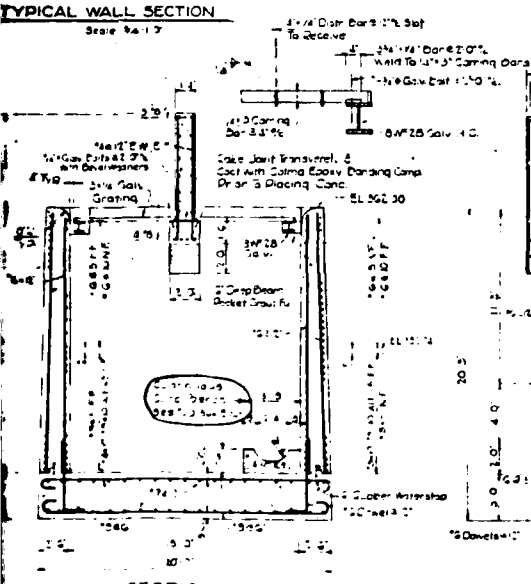
TYPICAL WALL SECTION

Scale: 3/8"=1'-0"



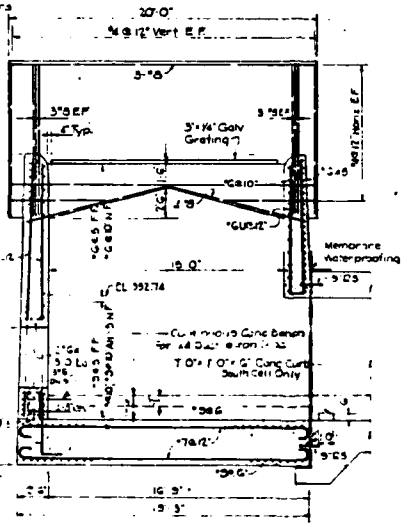
TYPICAL WALL SECTION AT CULVERT

Scale: 3/8"=1'-0"



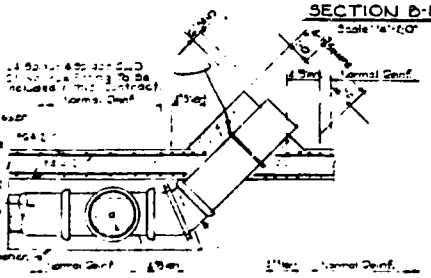
SECTION A-A

Scale: 1/4"=1'-0"



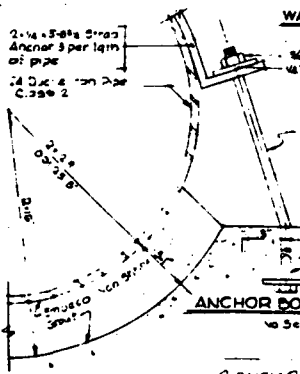
SECTION B-B

Scale: 1/4"=1'-0"



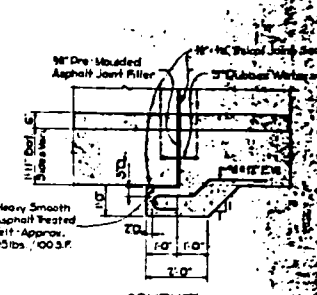
PLAN

DETAIL A



ANCHOR BOLT DETAIL

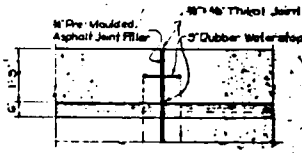
No Scale



CONDUIT

TYPICAL JOINT AT SIDES & BOTTOM

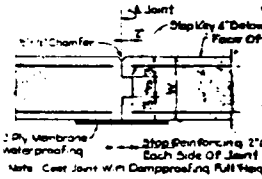
Scale: 1/2"=1'-0"



CONDUIT

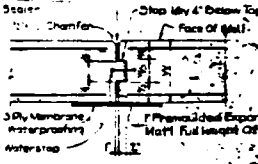
TYPICAL JOINT AT TOP

Scale: 1/2"=1'-0"



WALL - CONTRACTION JOINT DETAIL

Scale: 1"=1'-0"



WALL - EXPANSION JOINT DETAIL

Scale: 1"=1'-0"

SIDNEY O. DEWBERRY

MARYLAND PE #9872

Details Outlet Conduit

LAKE WHETSTONE

Montgomery Village, Maryland

Greenhorne - O'Mara - Dewberry & Nealon

Civil Engineers — Land Surveyors

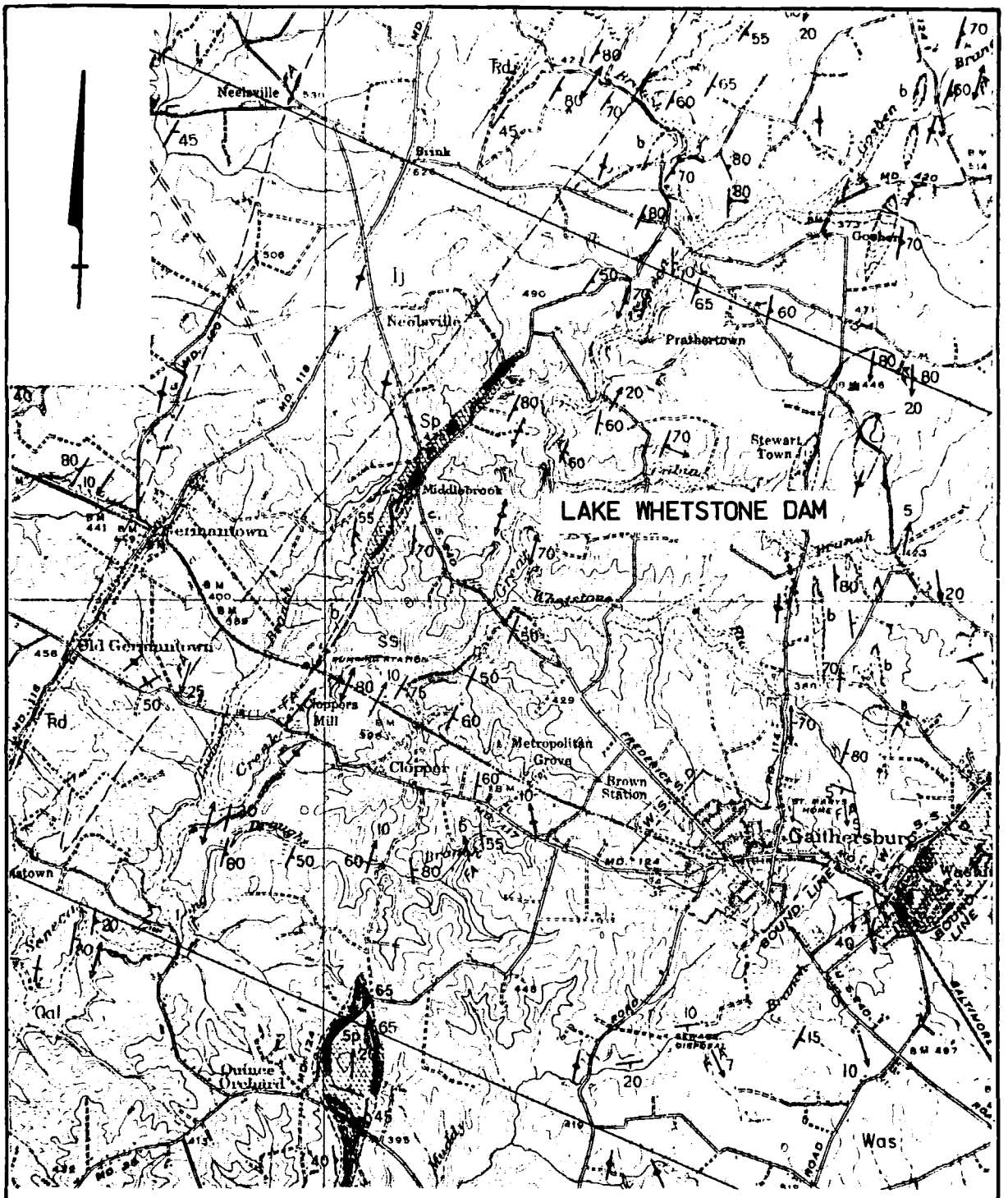
6811 Arlington Blvd. Fairfax, Virginia

APPENDIX F

GEOLOGY

LAKE WHETSTONE
APPENDIX F
REGIONAL GEOLOGY

The Lake Whetstone Dam is located within the Piedmont Physiographic Province and is situated on rock strata of the Wissahickon Formation, which is characterized by phyllites, schists, and sandstone and conglomerate beds. Minor alluvial deposits have also been mapped along Whetstone Run. The age of the Wissahickon and its stratigraphic relationship with adjacent rock formations are uncertain. It is estimated that the thicknesses of the Wissahickon Formation exceeds many thousands of feet. Strata in the vicinity of the dam dip very steeply to the east-southeast.



REFERENCE:

GEOLOGIC MAP OF MONTGOMERY COUNTY, PREPARED BY THE STATE OF MARYLAND, MARYLAND GEOLOGICAL SURVEY, DATED 1953

LAKE WHETSTONE DAM

GEOLOGY MAP

RUMMEL, KLEPPER & KAHL

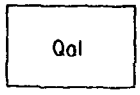
LEGEND

Wissahickon formation

(Banded or laminated quartz-rich phyllites and schists with magnetite, quartz veins, sandstone and conglomerate beds composed of muscovite, chlorite, albite, quartz. Grading into coarser schist to the east. Includes some Marburg schist. May be the equivalent of Harpers to the west. Calcareous layers are common. Interfingers with Ijamsville phyllite. ss: sandstone beds)

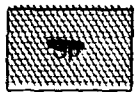
Ijamsville phyllite

(Soft purple or green phyllite and slate in places with flattened amygdules. Composed of muscovite, chlorite or chloritoid, quartz, and fine ilmenite or iron oxide dust. Interbedded with greenstone and sericite schist. In part equivalent to Marburg schist in Frederick County. Underlain by quartzite bed)



Alluvium

(Shown only along major streams)



Serpentine

REFERENCE:

GEOLOGIC MAP OF MONTGOMERY COUNTY, PREPARED BY THE STATE OF MARYLAND, MARYLAND GEOLOGICAL SURVEY.

LAKE WHETSTONE DAM

GEOLOGY MAP

RUMMEL, KLEPPER & KAHL